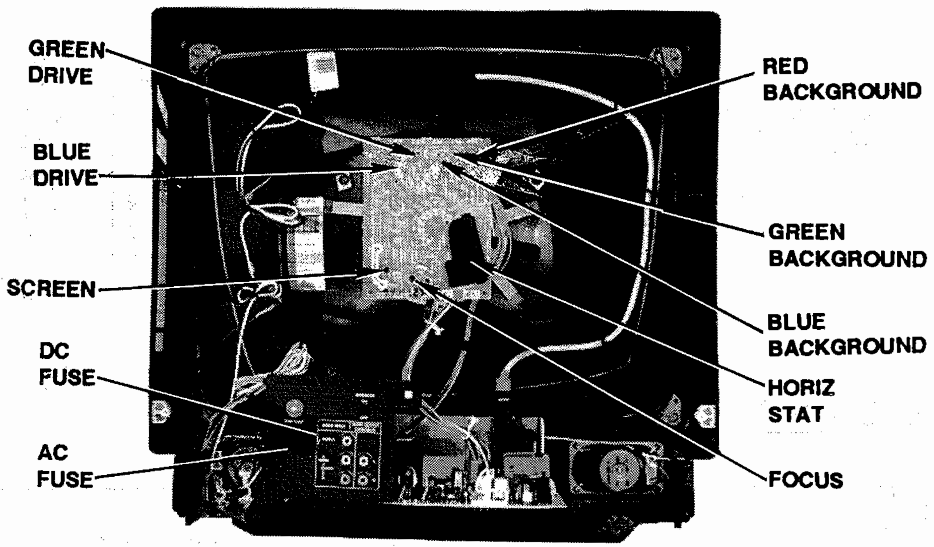
CABINET - REAR VIEW



The listing of any available replacement part herein in no case constitutes a recommendation, warranty, or guarantee by Howard W. Sams & Company as to the quality and suitability of such replacement part. The numbers of the listed parts have been compiled from information furnished to Howard W. Sams & Company by the manufacturers of the specific type of replacement part listed.

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Printed in the United States of America 5 4 3 2 1

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2839

SET 2839

MODELS KV-19TR10, KV-19TR20 (CH. SCC-D37E-A, F-A)

SONY

PHOTOFACT® Technical Service Data

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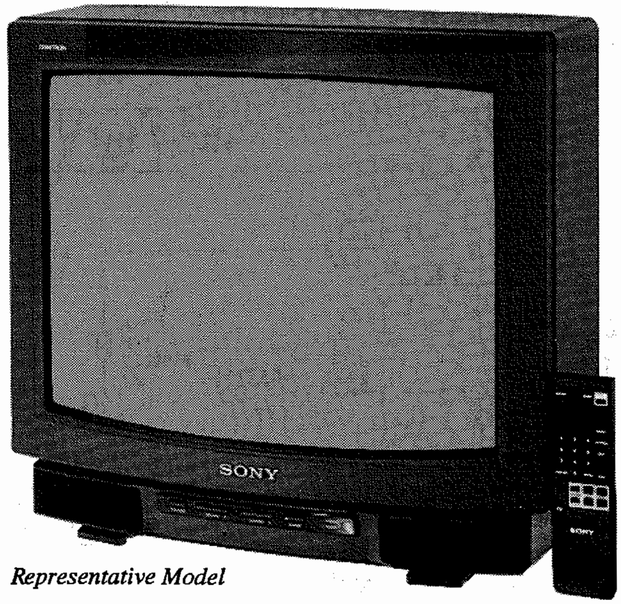
SONY

Models KV-19TR10, KV19TR20



Representative Model

Complete coverage for servicing a television receiver...

- Schematics
- Component locations
- Parts lists
- Troubleshooting guide

HOWARD W. SAMS & COMPANY
JULY 1991 SET 2839

2839

SAFETY PRECAUTIONS

SERVICE WARNING

ONLY qualified service technicians who are familiar with safety checks and guidelines should perform service work. For continued SAFETY:

1. Before replacing parts, disconnect power source to protect electrostatically sensitive parts.
2. Do not attempt to modify any circuit unless so recommended by the manufacturer.
3. When servicing chassis, use an isolation transformer between the line cord and power receptacle.

SERVICING HIGH VOLTAGE AND PICTURE TUBE

Use EXTREME CAUTION when servicing the High Voltage circuits.

1. To discharge static High Voltage, connect a 10k ohm resistor in series with a test lead between chassis and picture tube anode lead.
2. DO NOT lift picture tube by the neck.
3. ALWAYS wear shatterproof goggles when handling picture tube to protect eyes in case of implosion.

X-RAY RADIATION AND HIGH VOLTAGE LIMITS

Be aware of the instructions and procedures covering x-ray radiation. In solid-state receivers and monitors, the picture tube is the only potential source of x-rays.

1. Keep an accurate High Voltage meter available at all times. Check meter calibration periodically.
2. Whenever servicing a chassis, check High Voltage at various brightness levels to be sure it is regulating properly.
3. Keep High Voltage at rated value, NO HIGHER. Excessive High Voltage may cause x-ray radiation or failure of associated components. DO NOT depend on protection circuits to keep voltage at rated value.
4. When troubleshooting a set with excessive High Voltage, avoid close contact with picture tube. DO NOT operate set longer than necessary. To locate the cause of excessive High Voltage, use a variable AC transformer to regulate voltage.
5. In present chassis, many electrical and mechanical components have safety-related characteristics which are not detectable by visual inspection. Such components are identified by a # on both the schematic and the parts list. For SAFETY, use only equivalent replacement parts when replacing these components.

SAFETY CHECKS – FIRE AND SHOCK HAZARD

Cold Leakage Checks for Sets with Isolated Ground

1. Unplug the AC cord and connect a jumper across the plug prongs.
2. Turn the power switch ON.
3. Use an ohmmeter to measure the resistance between the jumpered AC plug and any exposed metal cabinet parts such as: antenna screw heads, control shafts, handle brackets. Exposed metal parts with a return path should measure between 200k ohms and 5 megohms. Parts without a return path must register infinity.

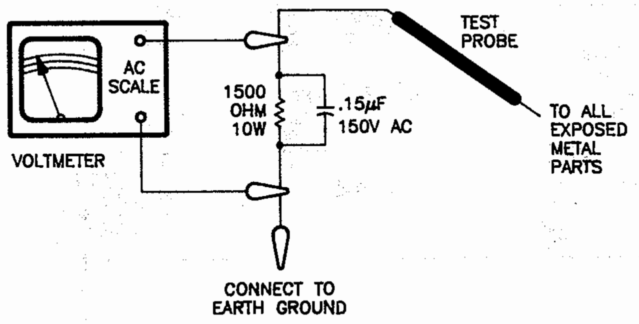
Hot Leakage Current Check

1. Plug the AC cord directly into AC outlet. DO NOT use an isolation transformer.
2. Use a 1500 ohm, 10W resistor in parallel with a 1.5 V AC capacitor to connect between any exposed metal parts on the set and a good earth ground, such as a water pipe. (See Figure below.)
3. Use an AC voltmeter with at least 1000 ohms-per-volt sensitivity to measure the voltage across the resistor. Check all exposed metal parts and measure voltage at each point.
4. Voltage readings should not exceed .75V RMS (5 milliamps AC). Any value exceeding this limit constitutes a potential shock hazard and must be corrected.
5. Reverse the AC plug and repeat exposed metal part voltage measurement at each point.

GENERAL GUIDELINES

Perform a final SAFETY CHECK before returning set to customer.

1. Check repaired area for poorly soldered or de-soldered connections, and entire circuit board for solder splashes.
2. Check inner board wiring for pinched wires or wires contacting any high-wattage resistors.
3. Check that all control knobs, shields, covers, grounds and mounting hardware have been replaced. Be sure to replace all insulators and restore proper lead dress.



TROUBLESHOOTING

POWER SUPPLY

Check the AC Fuse (F601) and DC Fuse (F602). If Fuse F601 is open, check Bridge Rectifier Diode (D601), Capacitor C601 and Thermistor (THP601). If Fuse F602 is open, check the Horizontal Output Transistor (Q551) and Regulator IC (IC601). Apply 120VAC, and check for 158V at the cathode of Diode D601. If this voltage is absent, check the voltages and components associated with Relay (RY601) and Relay Drive Transistor (Q601). If 158V is present at the cathode of Diode D601, check for 135V at TP91. If this voltage is absent, check the voltages and components associated with IC601 and Transistor Q551. If the voltage at TP91 is 166V, the TV may be in shutdown. Refer to the "Horizontal" and "High Voltage Shutdown" sections of this Troubleshooting guide.

AUDIO

Select an active TV channel and check for an audio waveform at TP21. If there is no audio, check voltages, waveforms and components associated with MPX Driver Transistor (Q201), and pin 10 of IF Pack (IF201). If audio waveform is present at TP21, check for audio waveform at pin 6 of AF-Amp IC (IC251). If there is no audio, check voltages, waveforms and components associated with pins 7,8,9,11 of IF201, and Audio Switch IC (IC406). If audio waveform is present at pin 6 of IC251, check voltages, waveforms and components associated with IC251. Check the voltage at pin 7 of IF201. It should measure 0V at mute and 8.0V at Maximum volume.

VIDEO

Inject a video signal at TP12 and check for video on CRT. If video is present, refer to the "IF-AGC" section of this Troubleshooting guide. If there is no video on CRT, check for a video waveform at pin 43 of Y/Chroma/Jungle IC (IC301). If there is no video, check voltages, waveforms and components associated with Video Switch IC (IC302) and Buffer Transistor (Q503). If video is present at pin 43 of IC301, check voltages, waveforms and components associated with pins 31 thru 37, and 40 thru 43 of IC301. If the brightness is inadequate or cannot be controlled, check voltages, waveforms and components associated with pin 40 of IC301 and pin 5 of CRT.

IF-AGC

Inject a video IF signal at IF Input and check for video on CRT. If video is present, check Tuner, Tuner control and Tuner AFC circuits. If there is no video on CRT, check for a video waveform at TP12. If video is present at TP12, refer to "Video" section of this Troubleshooting guide. If there is no video at TP12, check voltages, waveforms and components associated with pins 1, 2, 3, 6 and 12 of IF/Module (IF201). A defective AGC circuit can cause an overloaded picture, excessive snow or loss of audio and video. See AGC Voltage Chart for AGC voltages with signal.

AGC VOLTAGE CHART
IF201
Pin 1 5.4V

CHROMA

Check for a chroma waveform at pin 46 of Y/Chroma/Jungle IC (IC301). If the waveform is missing, check the components associated with pin 46. If a chroma waveform is present at pin 46, check for proper chroma waveforms at pins 27, 28, 29 of IC301. If these waveforms are missing, check voltages, waveforms and components associated with pins 8, 27, 28, 29, 32, 33 thru 39 and 46 of IC301. Check 3.58MHz oscillator at pin 8 of IC301. If there is inadequate color, check voltages and components associated with pin 39 of IC301. If there is inadequate tint range, check voltages, waveforms and components associated with the Sub Hue Control and pin 38 of IC301. If the proper chroma waveforms are present at pins 27, 28 and 29 of IC301, refer to "Raster" section of this Troubleshooting guide.

HORIZONTAL

Determine if TV is in shutdown, refer to "High Voltage Shutdown" section of this Troubleshooting guide. If TV is not in shutdown, inject a horizontal signal at base of Horizontal Output Transistor (Q551). If horizontal deflection is now present check voltages, waveforms and components associated with Horizontal Drive Transistor (Q550) and pins 2 thru 6, 11, 12, 13 and 15 thru 18 of Y/Chroma/Jungle IC (IC301). If there is still no horizontal sweep, check voltages, waveforms and components associated with Transistor Q551 and Horizontal Output Transformer (T504). Check voltages and components associated with Diodes D511, D517, D518 and D597 for defects. The High Voltage Rectifier is part of Transformer T504 and if defective will affect the performance of the horizontal circuits. If Horizontal Oscillator is off frequency, check voltages, waveforms and components associated with pins 2 and 13 of IC301. Horizontal linearity or foldover problems may be caused by Capacitors C552, C554, C555, C563, C565 being defective.

TROUBLESHOOTING continued

HIGH VOLTAGE SHUTDOWN

The High Voltage is monitored by Diode D321, rectifying pulses from the Horizontal Output Transformer (T504). Should the high voltage increase, the rectified voltage at the cathode of Diode D321 will also increase which causes the voltage at pin 8 of Protection Module (PM501) to increase. As the voltage increases at pin 8 of PM501, the voltage at pin 16 of Y/Chroma/Jungle IC (IC301) increases and triggers the set into shutdown. To troubleshoot, remove R325 from the circuit. Supply AC power to the set with a variable transformer. Start at 80VAC and increase AC voltage as necessary to locate and repair the malfunction. Replace R325.

NOTE: Care should be taken in defeating the high voltage shutdown circuit, as this may cause excessive X-radiation and damage to CRT, and Transformer T504. Monitor high voltage and troubleshoot.

Voltages Taken With TV In Shutdown

IC301	
Pin 15	6.0V
Pin 16	3.3V

HIGH VOLTAGE SHUTDOWN TEST

Apply 120VAC, turn set on, set all customer controls for normal operation. Connect a regulated DC power supply, through an isolation diode, to TP85. Connect a voltmeter to TP85. Monitor the voltage at TP85 while slowly increasing the DC power supply voltage. The set should go into shutdown before the voltage at TP85 reaches 144V. If set does not go into shutdown before the voltage at TP85 reaches 144V then the high voltage shutdown circuit should be repaired. To resume normal operation, remove AC Power and wait 30 seconds then turn set on.

NOTE: When the shutdown circuit is activated the set will lose raster and sound.

VERTICAL

Inject a vertical drive signal at pin 22 of Y/Chroma/Jungle IC (IC301). If vertical deflection is now present, check voltages, waveforms and components associated with pins 21, 22, 23 of IC301. If there is still no vertical sweep, check voltages, waveforms and components associated with Vertical Output IC (IC501) and Pincushion Modulator IC (IC502). Vertical linearity or foldover problems may be caused by vertical feedback and bias circuits, check Electrolytics C516, C534, C539, C540 and C542 for defects.

SYNC

If there is no vertical or horizontal sync, check the voltages, waveforms and components associated with Sync Sep Buffer Transistor (Q502), and Clamp Transistor (Q507). If there is no vertical sync, check voltages, waveforms and components associated with pins 21, 22, 23, and 47 of Y/Chroma/Jungle IC (IC301), Vertical Sync Sep Buffer Transistor (Q504) and Buffer Transistor (Q506). If there is no horizontal sync, check voltages and components associated with pins 2, 4, 10, 11, 13 and 48 of IC301.

RASTER

Check CRT and CRT voltages. If there is no Red, check voltages and components associated with pin 29 of Y/Chroma/Jungle (IC301), and Red Output Transistor (Q703). If there is no Green, check voltages and components associated with pin 28 of IC301, and Green Output Transistor (Q702). If there is no Blue, check voltages and components associated with pin 27 of IC301, and Blue Output Transistor (Q701). If the raster has a keystone shape, check Deflection Yoke (DY801). If raster has height or width problems, refer to "Vertical", "Horizontal" and "Power Supply" sections of this Troubleshooting guide.

MISCELLANEOUS ADJUSTMENTS

Pretuning

NOTE: All procedures require an antenna connected and power applied to the set. Set Cable (CATV) Switch to On or Off position.

1. Momentarily depress the Power button.
2. Press the Auto Program button. Active channels are scanned for and stored in memory.

Add Channel

1. Connect antenna and set Cable (CATV) Switch to On or Off.
2. Momentarily depress the Power button.
3. Select channel. Use the Direct Channel Access buttons on remote transmitter.
4. Press the Add button on remote transmitter.
5. Repeat steps three and four to add other channels.

Erase Channel

1. Connect antenna and set Cable (CATV) to On or Off Switch position.
2. Momentarily depress the Power button.
3. Select channel. Use channel scanning buttons on remote transmitter.
4. Press the Erase button on remote transmitter.
5. Repeat steps three and four to erase other channels.

B+ VOLTAGE CHECK

Tune in a picture. Connect a Digital DC Voltmeter to TP91, (IC601,pin 4) low side to ground. With line voltage set to 120VAC B+ should read 135± 1VDC.

HIGH VOLTAGE CHECK

Tune in a inactive channel. Connect a High Voltage Probe to CRT Anode. High Voltage should read 27.5KV to 28.5KV. High Voltage must never exceed 29.0KV.

RF AGC ADJUSTMENT

Tune in a picture. Adjust AGC Control (IF Block) counterclockwise until snow (noise) appears in the picture, then clockwise until snow just disappears.

SUB BRIGHTNESS ADJUSTMENT

Tune in a picture. Set Brightness and Color to MINIMUM. Adjust Sub Brightness Control (RV706) to a point where highlights are just extinguished.

SUB CONTRAST ADJUSTMENT

Tune in a color bar pattern. Set picture to Maximum and color to MINIMUM. Connect an Oscilloscope to Plug A-8 pin 4, low side to ground. Adjust Sub Contrast Control (RV307) for 1.0V p-p portion of video portion of waveform.

HORIZONTAL FREQUENCY ADJUSTMENT

Tune in an off air signal. Connect a jumper between TP348 (IC301, pin 48) and TP336 (IC301, pin 36). Connect a Frequency Counter to the base of Transistor Q550 and adjust Horizontal Frequency Control (RV501) for 15.734-kHz (± 50Hz). Remove jumper.

HORIZONTAL CENTERING ADJUSTMENT

Tune in a crosshatch pattern. Move Horizontal Centering Connector to 1 of 5 terminals on A-13 for the best horizontal centering.

HORIZONTAL SIZE ADJUSTMENT

Tune in a crosshatch pattern. Adjust Horizontal Size Control (RV506) until picture extends just beyond edges of screen.

VERTICAL FREQUENCY ADJUSTMENT

Tune in an off air signal. Place a jumper between pins 36 and 47 of IC301. Connect a Frequency Counter to pin 2 of IC501. Adjust Vertical Frequency Control (RV502) for 55.0Hz (±.3Hz). Remove jumper.

VERTICAL CENTERING ADJUSTMENT

Tune in a crosshatch pattern. Place Vertical Centering Switch (S501) in one of three positions (Up, Center or Down), whichever gives the best vertical centering.

VERTICAL SIZE ADJUSTMENT

Tune in a crosshatch pattern. Adjust Vertical Size Control (RV507) until picture extends just beyond upper and lower edges of screen.

PINCUSHION ADJUSTMENTS

Tune in a crosshatch pattern. Adjust pin Amp Control (RV505) for straight vertical lines at sides of screen.

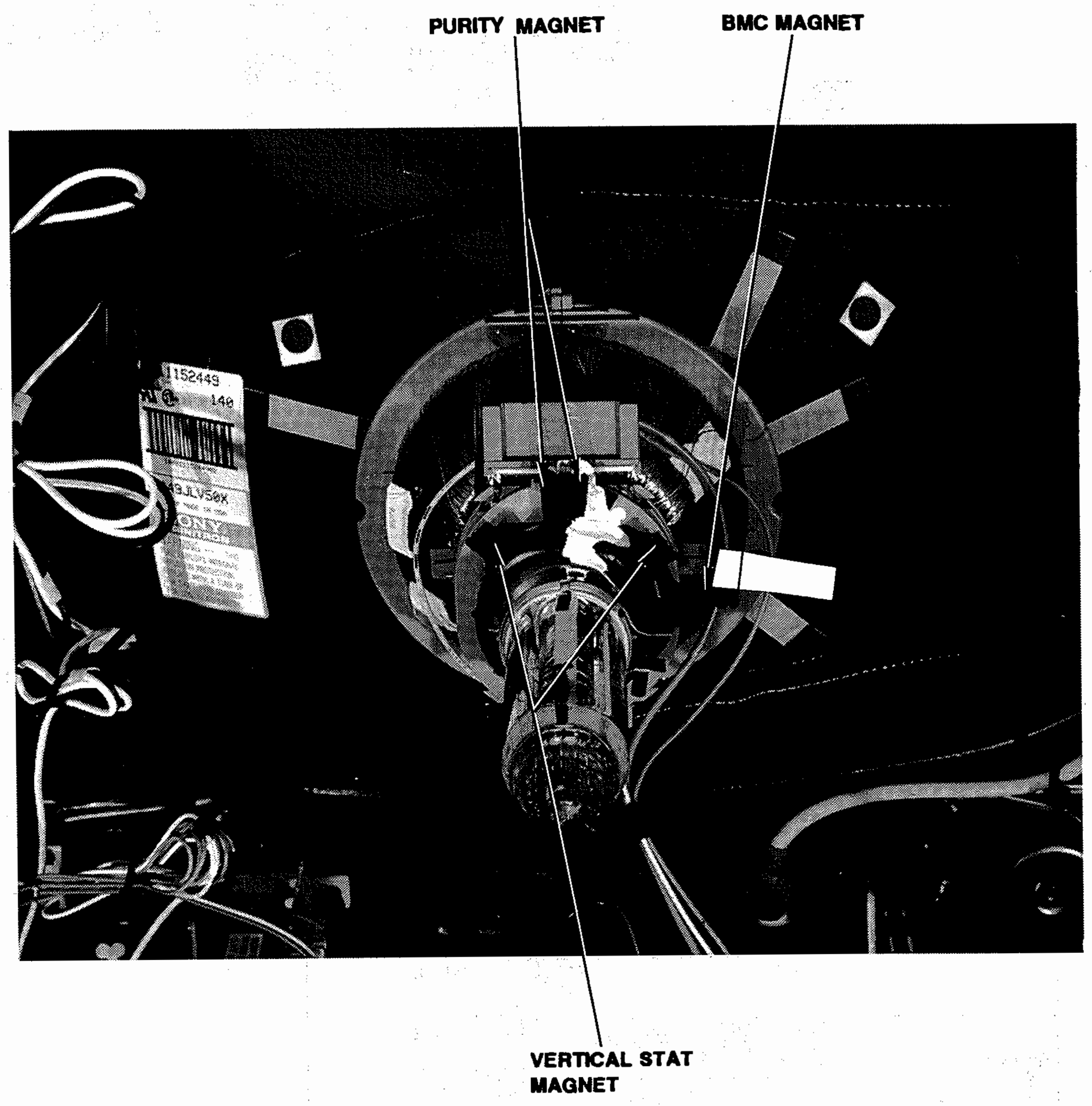
INDICATOR POSITION ADJUSTMENT

Tune in a picture. Obtain a picture control bar display. Adjust Character Position Control (RV131) to place right edge of bar 1 1/2" from right edge of screen.

MPX LEVEL ADJUSTMENT

Connect a B&K 2009 MTS TV/Stereo generator to antenna terminals (equivalent generator may be used). Select Pilot, 300Hz Audio Frequency and L-R modulating signal. Connect an Oscilloscope to TP21 (MM201,pin 2), low side to ground. Adjust MPX Level Control (RV201) for 700mVp-p.

CRT NECK ASSEMBLY



MISCELLANEOUS ADJUSTMENTS continued

SUB HUE ADJUSTMENT

Tune in a picture. Press the Reset button on the Remote Transmitter to set adjustment levels to factory preset. Adjust Sub Hue Control (RV306) for normal skin tones.

PURITY ADJUSTMENT

Use a degaussing coil to demagnetize the CRT and mounting brackets. Set Red Background Control (RV705) to Maximum, Blue (RV701) and Green (RV703) Background Controls to MINIMUM. Loosen Deflection Yoke (DY801) and slide it backward as far as possible. Adjust purity rings on rear of Deflection Yoke to center the vertical red band. Slide the Deflection Yoke forward until a uniform red screen is obtained. Check Blue and Green purity. If necessary use disc magnets or rotatable disc magnets to correct impurity at the corners of the screen. (See parts list.) Place disc magnets on rear of picture tube near the Deflection Yoke, move the disc magnets around to find the best correction point and adhere in place.

COLOR TEMPERATURE ADJUSTMENT

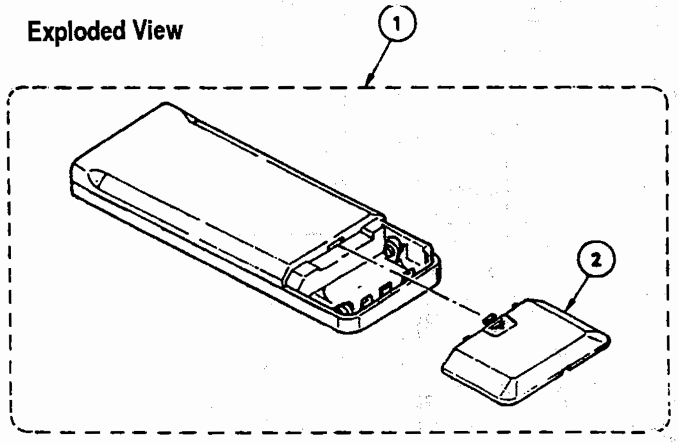
Connect a crosshatch generator to the antenna terminals and tune in a crosshatch pattern. Set brightness and picture to MINIMUM. Set Green (RV704) and Blue (RV702) Drive Controls to Midrange. Set Blue (RV701), Green (RV703) and Red (RV705) Background Controls to MINIMUM. Set Screen Control (RV708) to MINIMUM, then adjust it to obtain a faintly visible crosshatch pattern of one color. Adjust remaining two Background Controls for a white crosshatch pattern. Turn the Brightness and Picture Controls to Maximum. Adjust the Drive Controls for best white balance of the crosshatch pattern.

CONVERGENCE ADJUSTMENTS

Connect a crosshatch generator to antenna terminals and tune in a dot pattern. Adjust the Horizontal Static Control (RV709) to converge the Red and Blue dots over the Green dots horizontally at the center of the screen. Rotate the Vertical Static Magnets (4-pole) to converge the Red and Blue dots over the Green dots vertically at the center of the screen. NOTE: Some versions use a BMC magnet. To adjust the BMC magnet, slide it in and out to correct for insufficient horizontal static convergence, rotate the BMC magnet to correct for insufficient vertical static convergence. Tune in a crosshatch pattern and loosen the Deflection Yoke (DY801) screw. Remove the rubber wedges between the Deflection Yoke and the CRT. Tilt the Deflection Yoke up or down to converge the vertical lines at top and bottom of screen and the horizontal lines at the right and left sides of the screen. Tilt the Deflection Yoke right or left to converge the vertical lines at the right and left sides of the screen and the horizontal lines at the top and bottom of the screen. Repeat convergence procedure if necessary to obtain best overall convergence. Apply adhesive to wedges and carefully replace on CRT. If misconvergence is still present on circumference of screen, place a permalloy magnet assembly (part # X-4308-815-0) between CRT and Deflection Yoke behind affected areas of CRT. Slide permaloy assembly around until best correction is obtained. Adhere to CRT rear. Repeat Purity and Convergence Procedures if permalloy magnets are used.

REMOTE CONTROL TRANSMITTER

Exploded View



RM-780

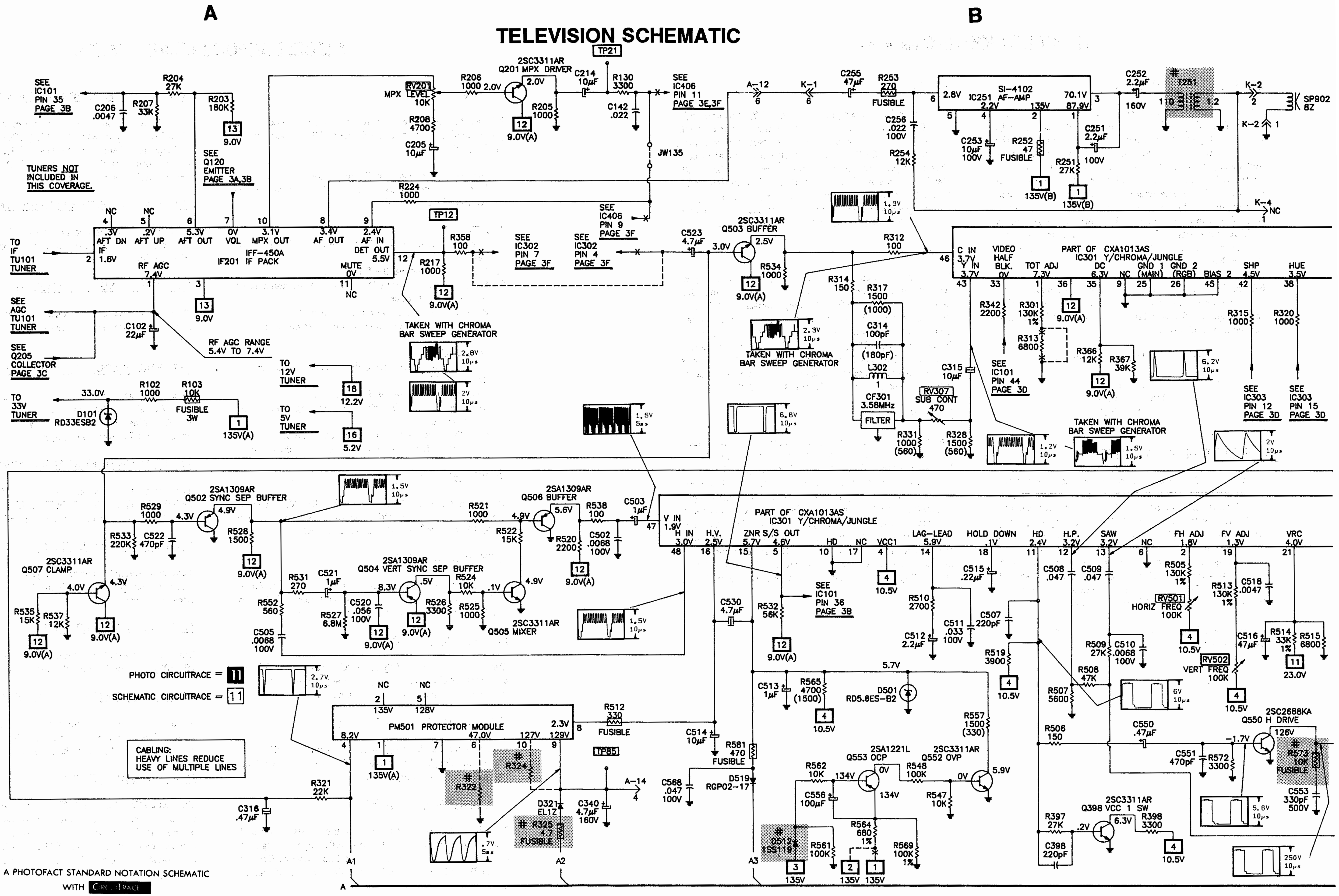
REF.NO	PART NO.	DESCRIPTION
1	1-465-386-11	REMOTE COMMANDER
2	4-394-031-01	COVER BATTERY

RM-781

REF.NO	PART NO.	DESCRIPTION
1	1-465-385-11	REMOTE COMMANDER
2	4-394-031-01	COVER BATTERY

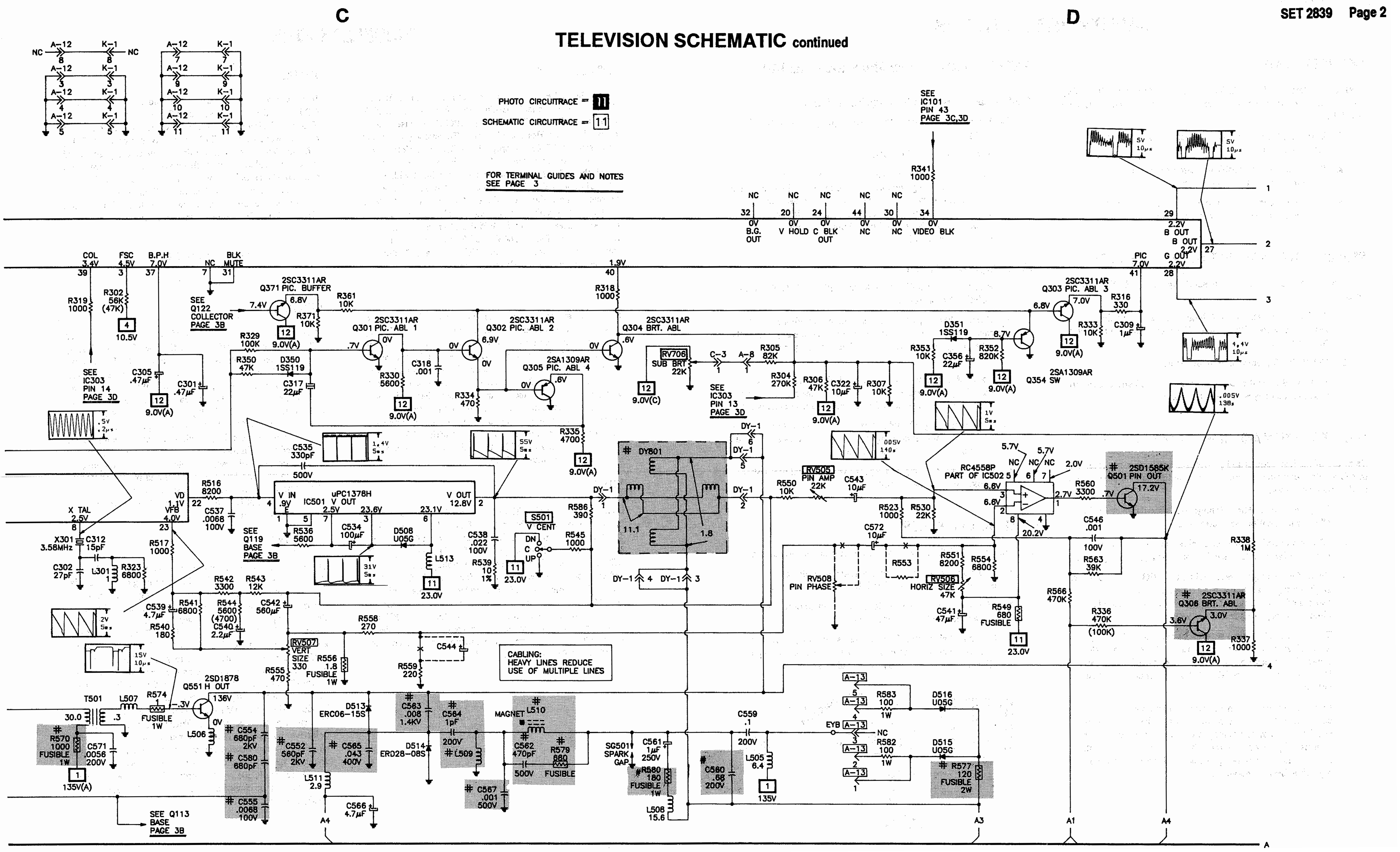
Courtesy of Manufacturer

TELEVISION SCHEMATIC



A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CircuiTrace

TELEVISION SCHEMATIC continued



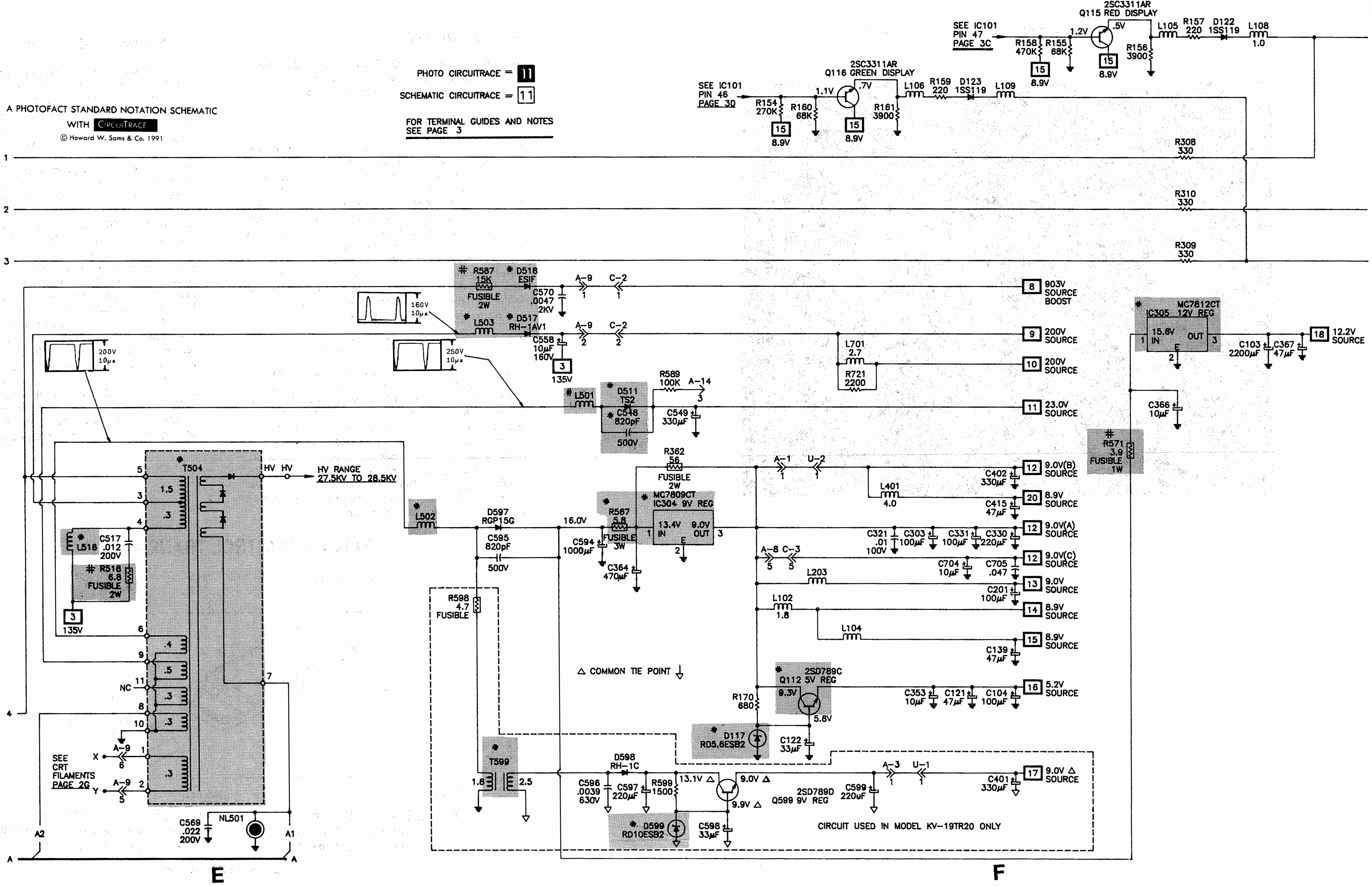
TELEVISION SCHEMATIC continued

A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CircuiTrace

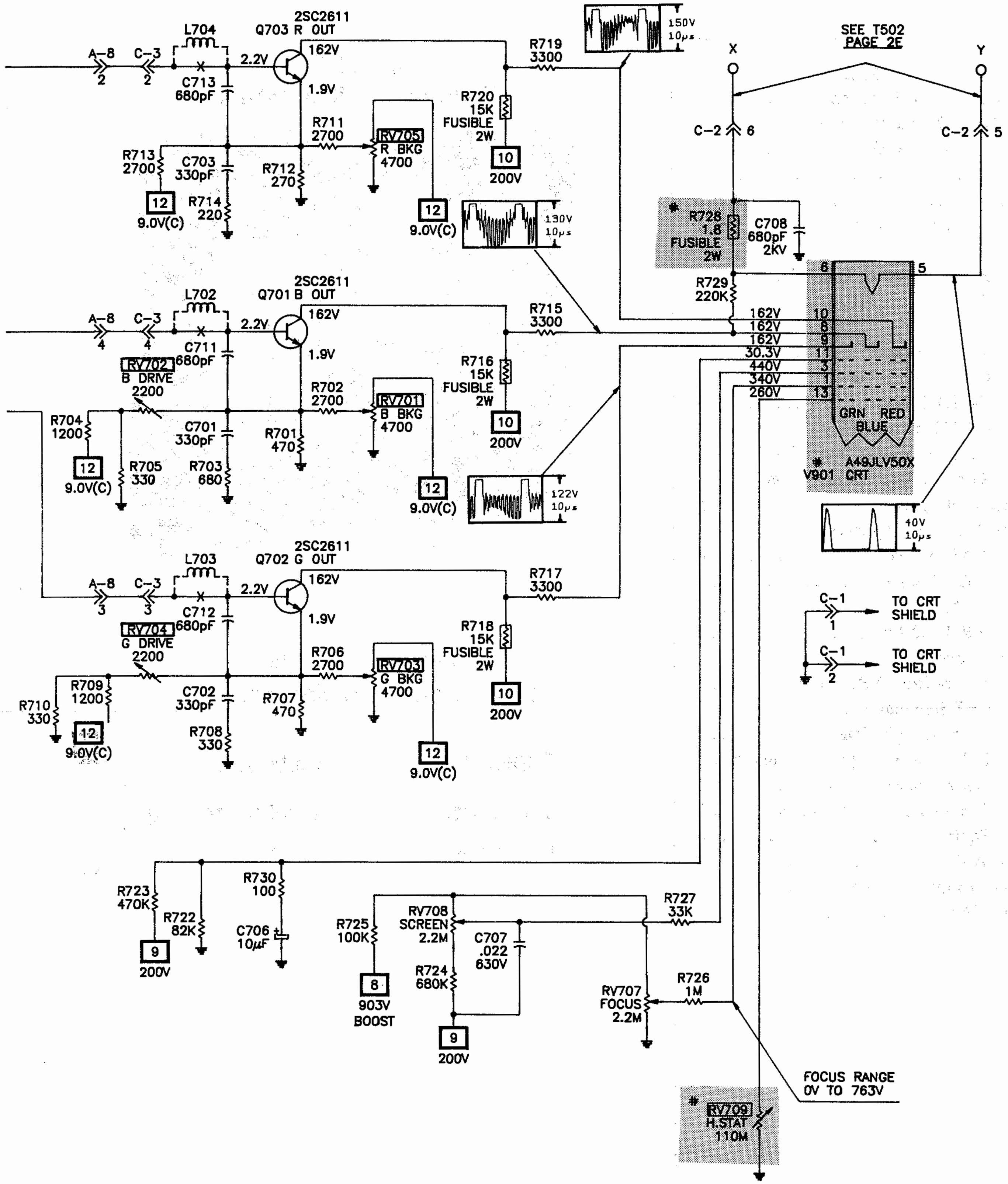
PHOTO CIRCUITRACE = 11

SCHEMATIC CIRCUITRACE = 11

FOR TERMINAL GUIDES AND NOTES SEE PAGE 3



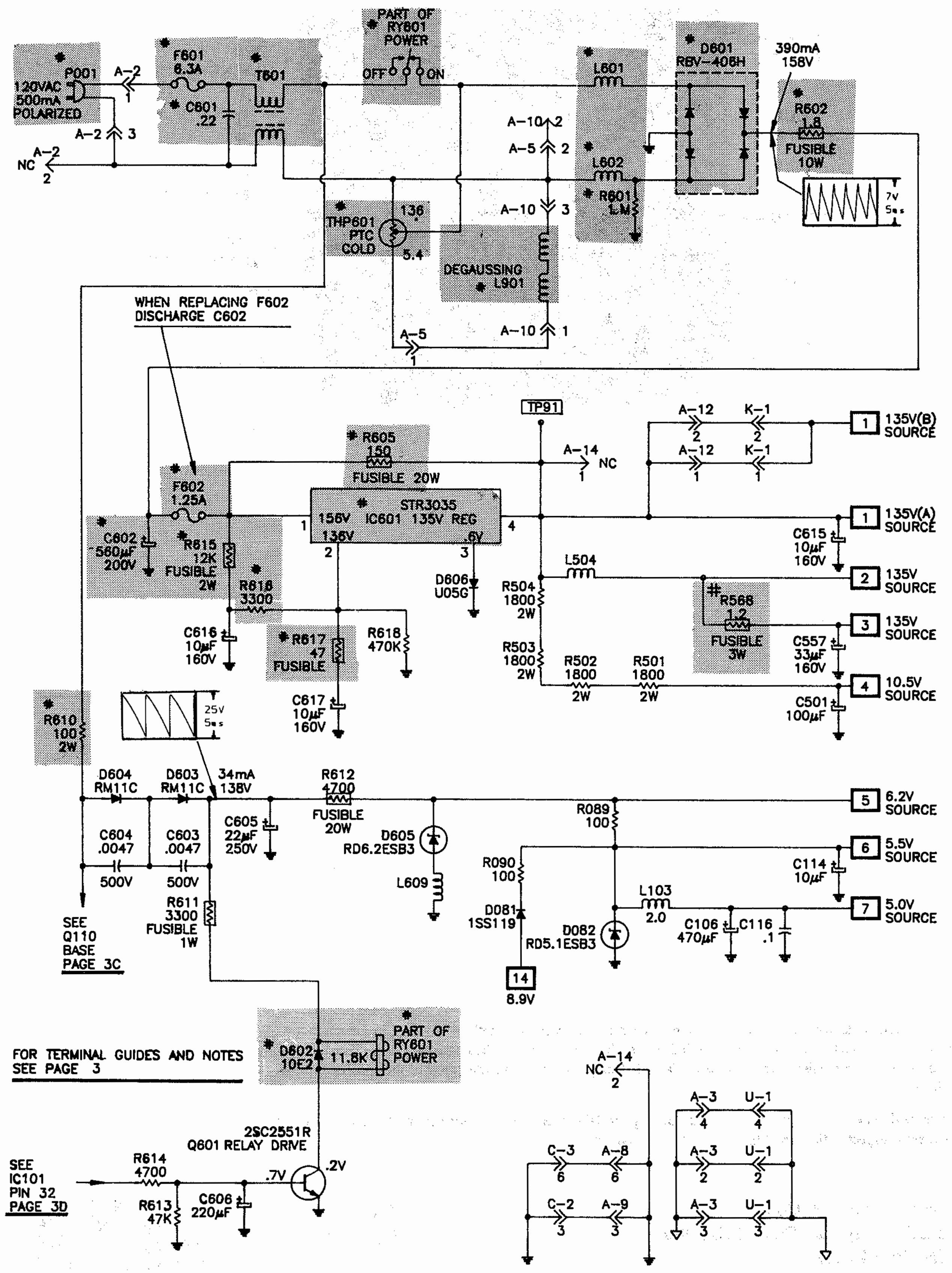
CRT SCHEMATIC



A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE

G

POWER SUPPLY SCHEMATIC



FOR TERMINAL GUIDES AND NOTES SEE PAGE 3

A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CIRCUITRACE

PHOTO CIRCUITRACE = 11

SCHEMATIC CIRCUITRACE = 11

H

PLL CONTROL DISPLAY

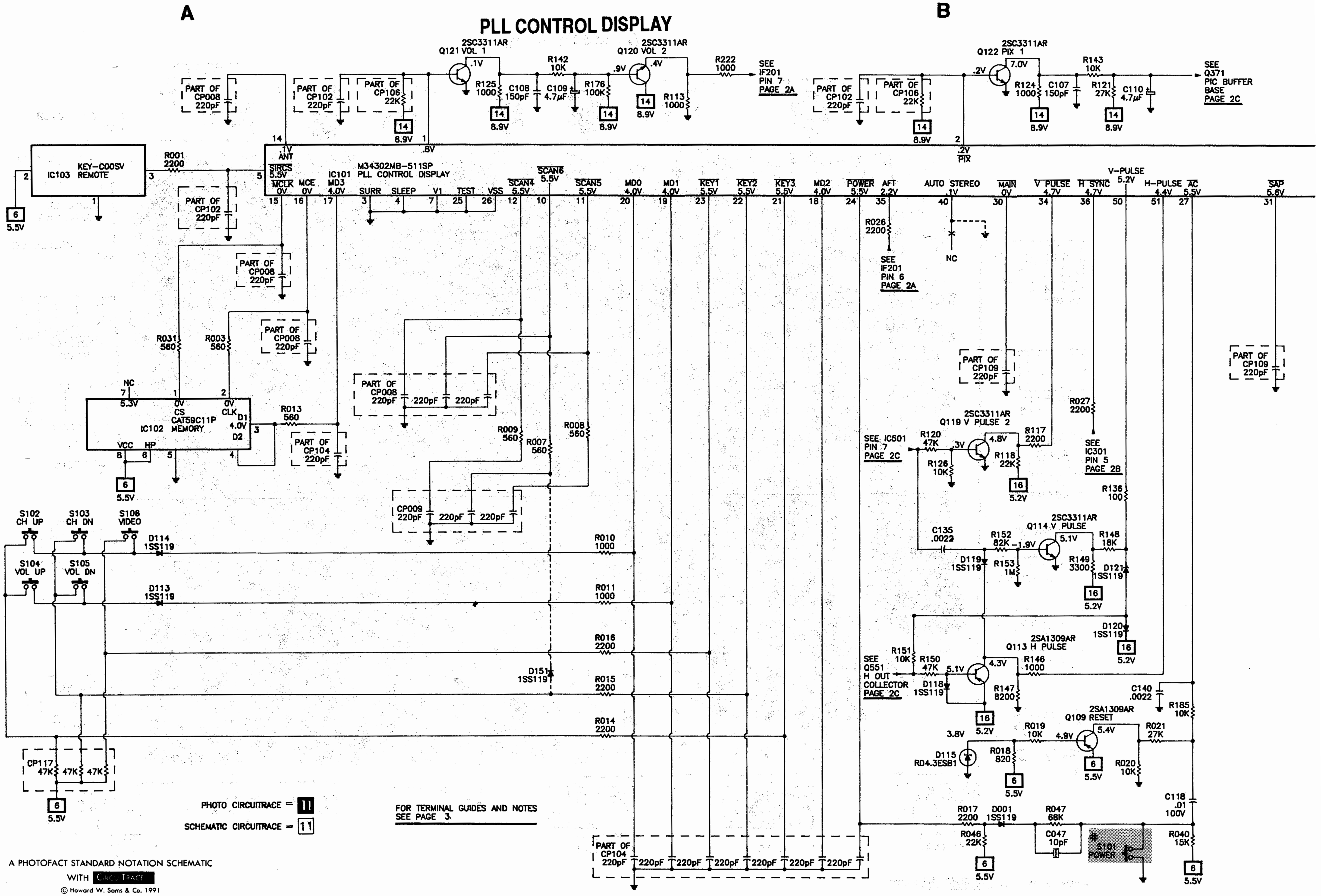


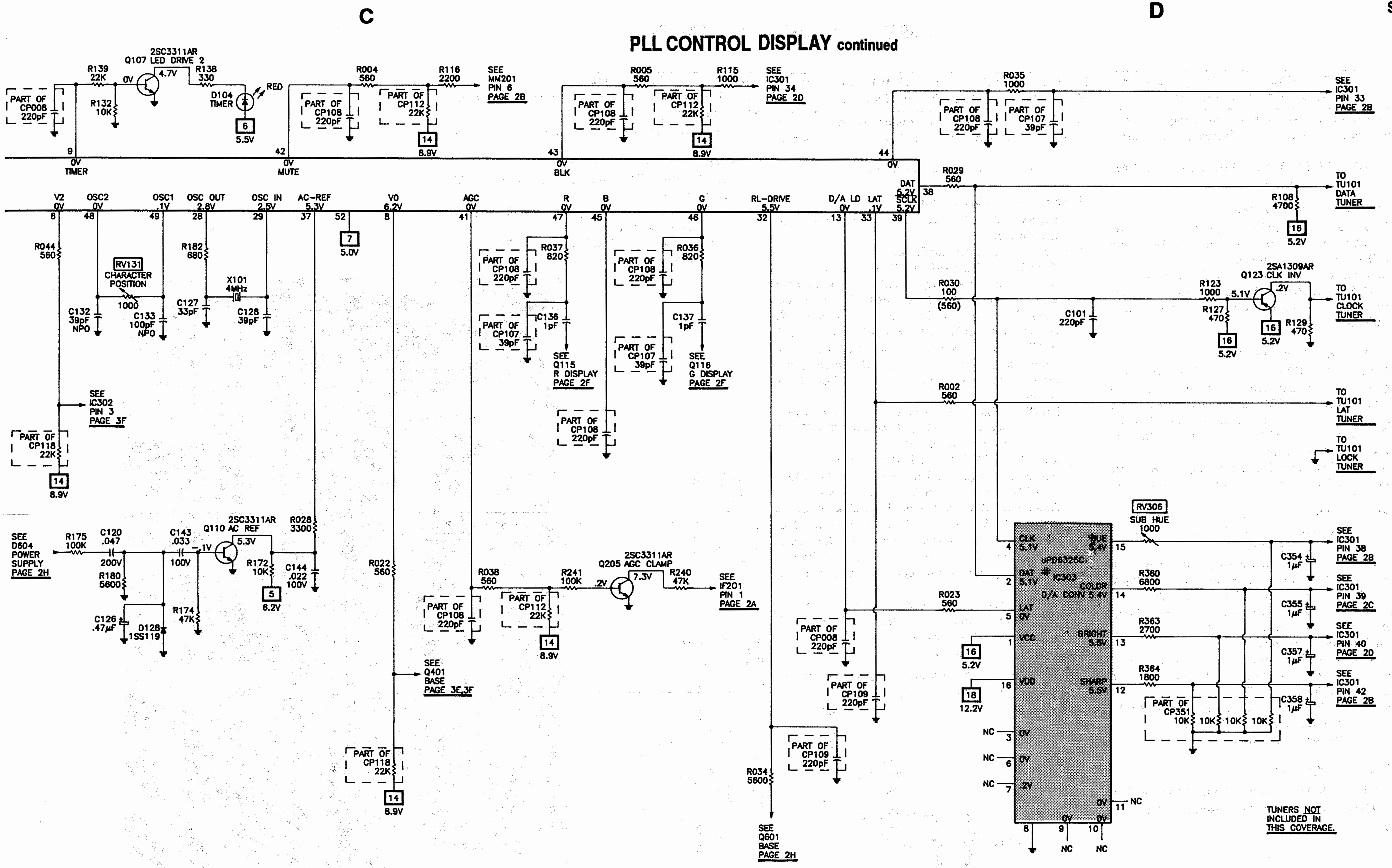
PHOTO CIRCUITRACE = 11

SCHEMATIC CIRCUITRACE = 11

FOR TERMINAL GUIDES AND NOTES SEE PAGE 3.

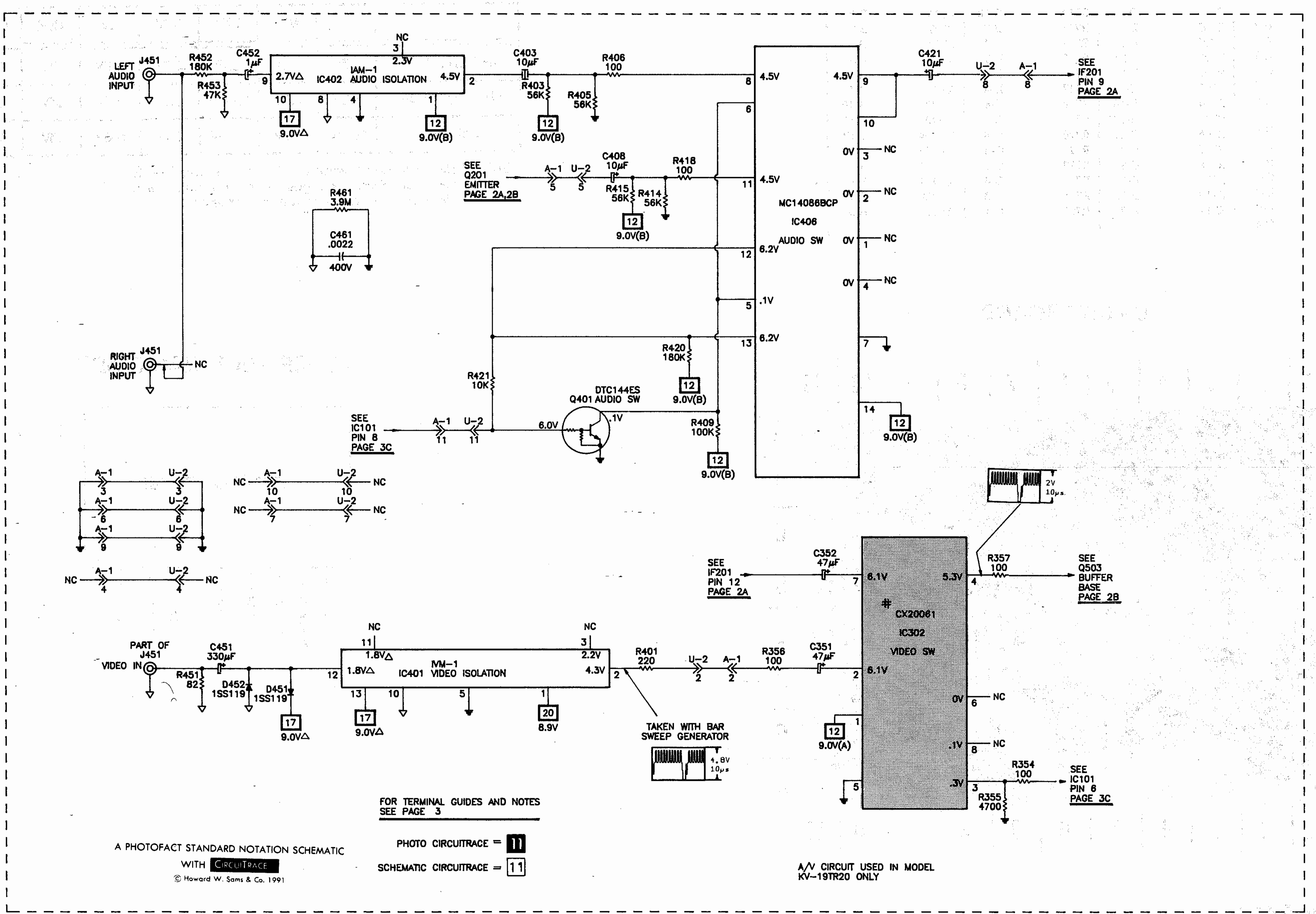
A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CircuiTrace

PLL CONTROL DISPLAY continued



TUNERS NOT INCLUDED IN THIS COVERAGE.

AUDIO/VIDEO SCHEMATIC



FOR TERMINAL GUIDES AND NOTES
SEE PAGE 3

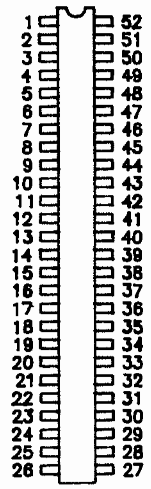
PHOTO CIRCUITRACE = 11

SCHEMATIC CIRCUITRACE = 11

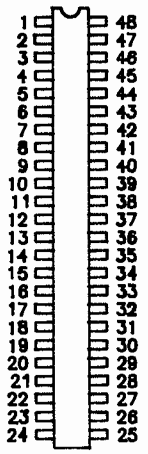
A PHOTOFACT STANDARD NOTATION SCHEMATIC
WITH CircuiTrace

A/V CIRCUIT USED IN MODEL
KV-19TR20 ONLY

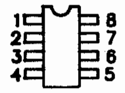
TERMINAL GUIDES AND NOTES



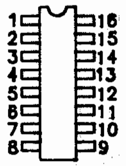
IC101
TOP VIEW



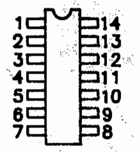
IC301
TOP VIEW



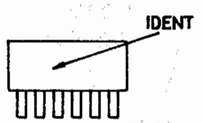
IC102, IC502
TOP VIEW



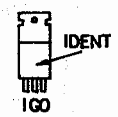
IC303
TOP VIEW



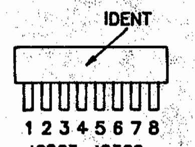
IC406
TOP VIEW



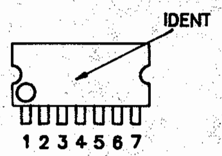
IC251
FRONT VIEW



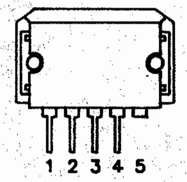
IC304, IC305
FRONT VIEW



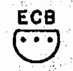
IC203, IC302
FRONT VIEW



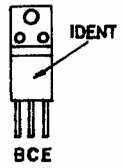
IC501
FRONT VIEW



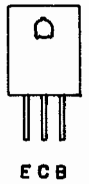
IC601
FRONT VIEW



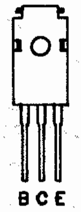
Q112, Q599, Q601
BOTTOM VIEW



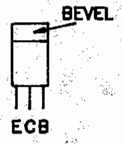
Q551
FRONT VIEW



Q550, Q701 THRU Q703
FRONT VIEW

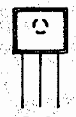


Q501
FRONT VIEW

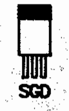


Q107, Q109, Q110,
Q113 THRU Q116,
Q119 THRU Q123, Q201,
Q205, Q301 THRU Q306,
Q354, Q371, Q398,
Q502 THRU Q507, Q552

FRONT VIEW



Q401
FRONT VIEW



Q553
FRONT VIEW

# For SAFETY use only equivalent replacement part, see parts list.

—✱— Circuitry not used in some versions
- - - Circuitry used in some versions
✱ Nominal value
⏚ Ground
⊥ Chassis
▽ Common tie point

Waveforms and voltages are taken from ground, unless noted otherwise.

Waveforms: triggered scope, keyed rainbow generator.

Item numbers in rectangles appear in the alignment/adjustment instructions.

Supply voltage maintained as shown at input.

Voltages measured with digital meter, no signal.

Controls adjusted for normal operation.

Terminal identification may not be found on unit.

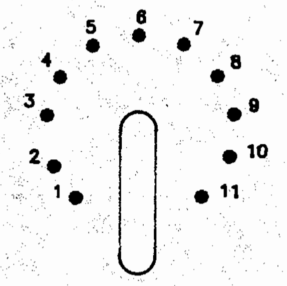
Capacitors are 50 volts or less.
5% or greater unless noted.

Electrolytic capacitors are 50 volts or less.
20% or greater unless noted.

Resistors are 1/2W or less.
5% or greater unless noted.

Value in ( ) used in some versions.

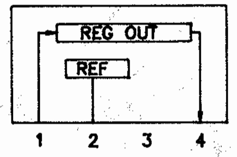
Measurements with switching as shown, unless noted



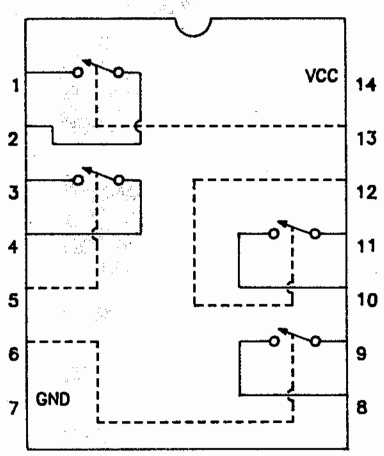
T403
BOTTOM VIEW

IC FUNCTIONS

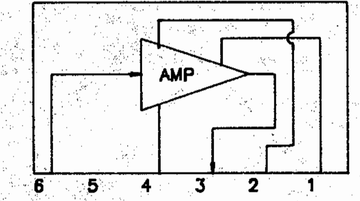
IC601
STR3035



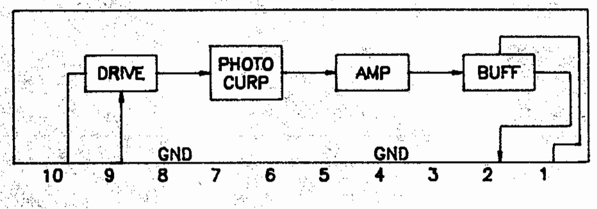
IC406
MC140066BCP



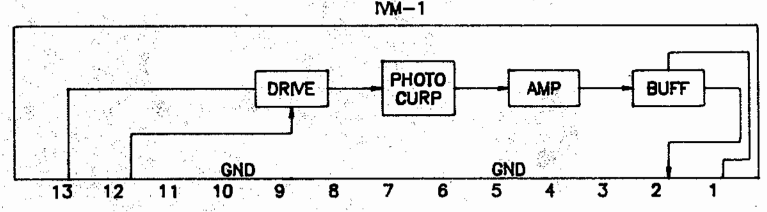
IC251
SI-4102



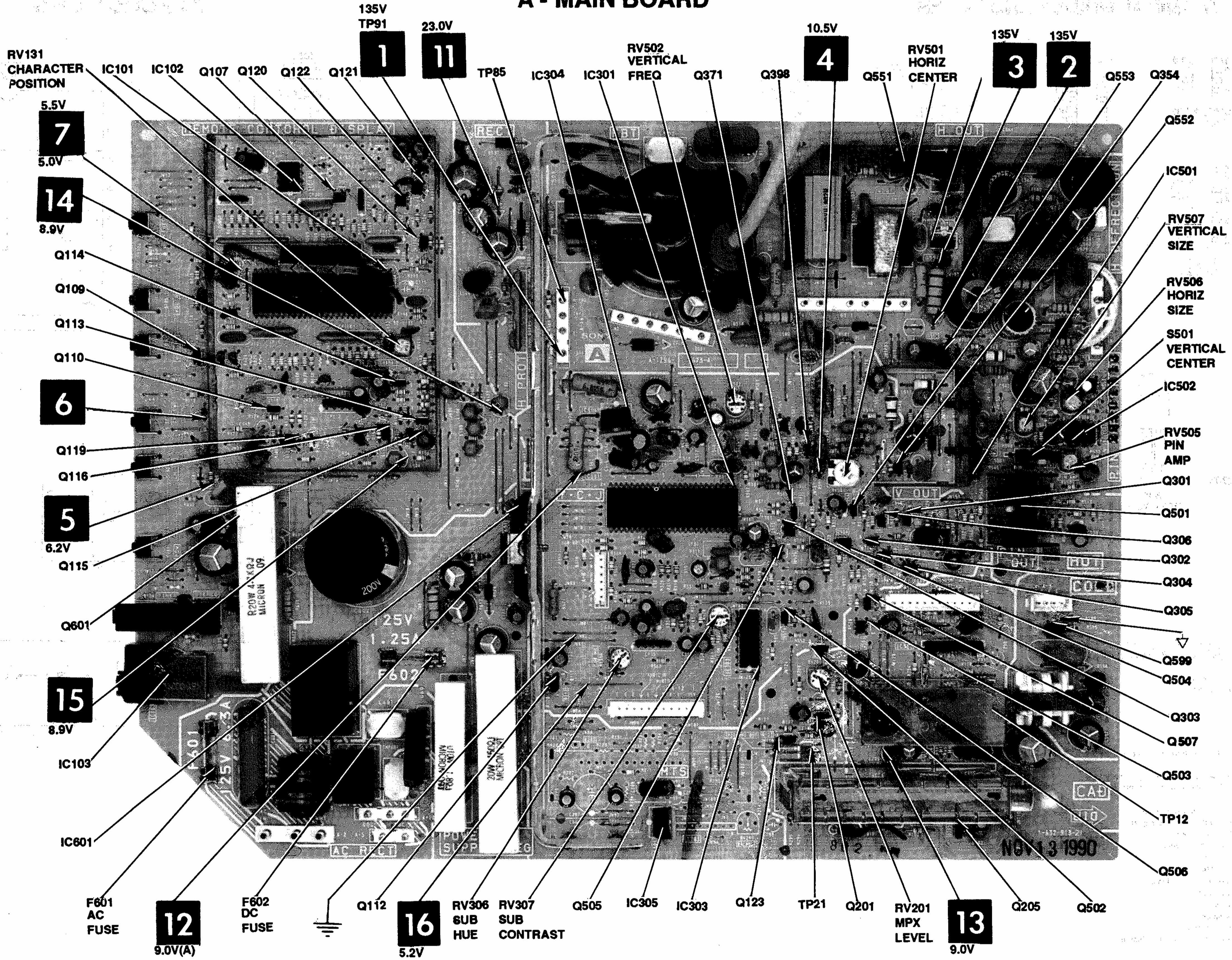
IC402
IAM-1



IC401
IVM-1



A - MAIN BOARD

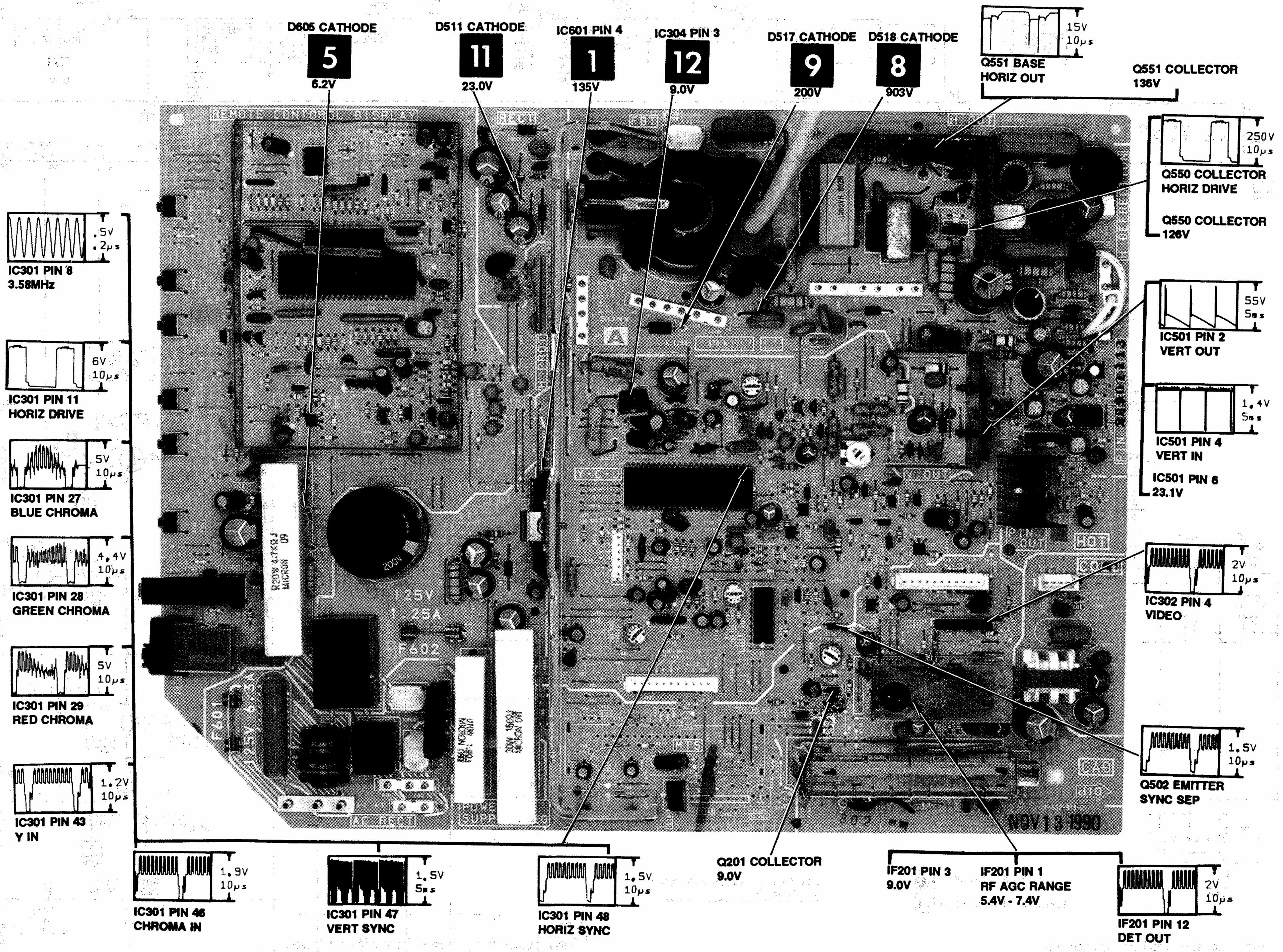


▽ COMMON TIE POINT

NOTE: ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED

NOTE: ARROWS ON TRANSISTORS INDICATE BASE UNLESS NOTED

A - MAIN BOARD

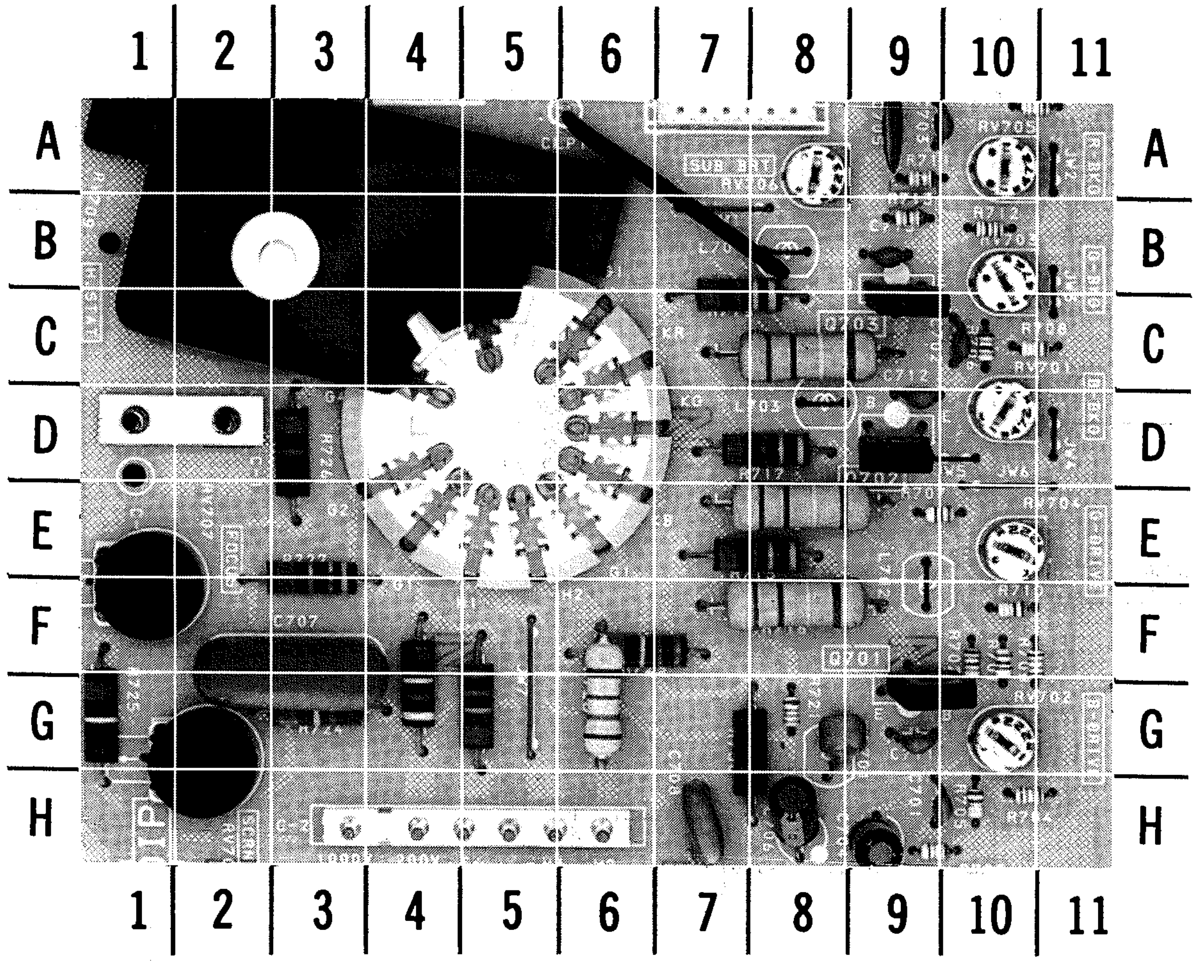


A HOWARD W. SAMS QUICK CHECKS PHOTO

C - CRT BOARD - GridTrace LOCATION GUIDE

C1	D-2	Q701	G-10	R712	B-10	R726	D-3
C2	H-3	Q702	D-9	R713	B-9	R727	E-3
C3	A-7	Q703	B-3	R714	A-10	R728	G-6
C701	H-9	R701	F-10	R715	E-8	R729	F-6
C702	C-10	R702	F-10	R716	F-8	R730	G-7
C703	A-9	R703	H-9	R717	D-8	RV701	D-10
C704	H-9	R704	H-10	R718	E-8	RV702	G-10
C705	A-9	R705	H-10	R719	C-7	RV703	B-10
C706	H-8	R706	C-10	R720	D-8	RV704	E-10
C707	F-3	R707	E-9	R721	G-8	RV705	A-10
C708	H-7	R708	C-8	R722	G-5	RV706	A-8
C711	G-9	R709	F-10	R723	G-4	RV707	F-1
C712	D-9	R710	E-10	R724	G-3	RV708	G-2
C713	B-9	R711	A-9	R725	G-1	RV709	B-3
L701	G-8						

C - CRT BOARD



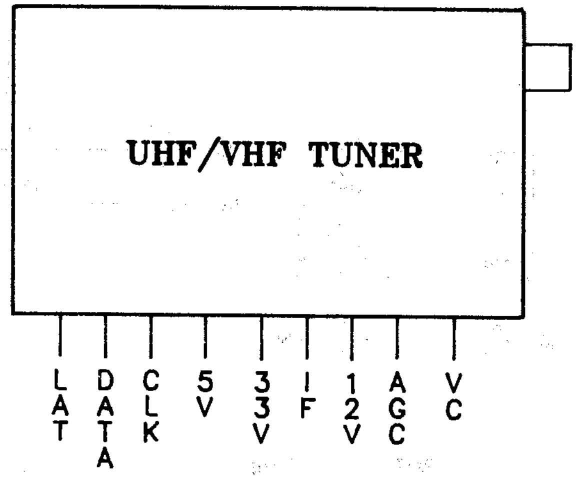
A HOWARD W. SAMS GRIDTRACE™ PHOTO

TUNER VOLTAGE CHART

	VC	AGC	12V	33V	5V	CLK	DATA	LAT
VHF Low Band	1.3V	7.4V	12.0V	33V	5.0V	.3V	5.0V	.5V
VHF High Band	3.8V	7.3V	12.0V	33V	5.0V	.3V	5.0V	.5V
UHF Band	16.7V	7.3V	12.0V	33V	5.0V	.3V	5.0V	.5V

NOTE: VHF Low Band voltages taken on channel 2.
VHF High Band voltages taken on channel 7.
UHF Band voltages taken on channel 14.

TUNER TERMINAL GUIDE



SAFETY RELATED ADJUSTMENTS

R324 CONFIRMATION METHOD (HOLD-DOWN CONFIRMATION) AND READJUSTMENTS

The following adjustments should always be performed when replacing the following components

IC601, IC301, PM501, D501, D321, C565, C563, R565, R512, R325, R324, T504, DY

1. Preparation before confirmation
   1) Turn the POWER switch ON, and receive entirely white signals and set the PICTURE and BRIGHT controls to maximum.
   2) Confirm that voltage of the check terminal of pin ④ of A-14 (A BOARD) is more than 126.0V DC when the set is operating normally with 120.0±2.0V AC supply.

2. Hold-down operation confirmation
   1) Turn the POWER switch ON, and receive entirely white signals and adjust ABL current to 1300 ±20μA with PICTURE and BRIGHT etc controls.
   2) Apply DC voltage to the check terminal of pin ④ of A-14 (A BOARD) via 1T40 from the DC stabilized power source.
      Confirm that the minimum voltage is less than 144.0V DC whereby the raster disappears during operation of hold-down circuit.
      NOTE: When the hold-down circuit starts operating, switch OFF the POWER of the set immediately.
   3) Turn the POWER switch ON, and receive dot signals and adjust ABL current to 30±20μA with PICTURE and BRIGHT etc controls.
   4) Apply DC voltage to the check terminal of pin ④ of A-14 (A BOARD) via 1T40 from the DC stabilized power source.
      Confirm that the minimum voltage is less than 144.0V DC whereby the raster disappears during operation of hold-down circuit.
      NOTE: When the hold-down circuit starts operating, switch OFF the POWER of the set immediately.

3. Hold-down readjustment

   When step 2 is not satisfied, readjustment should be performed by altering the resistance value of R324

Courtesy of Manufacturer

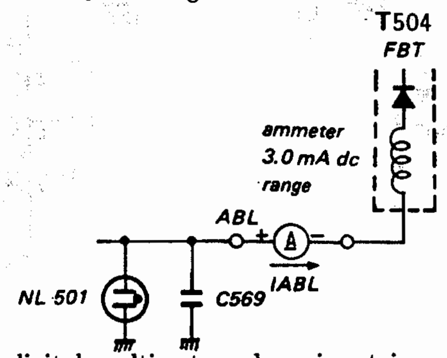
R322 CONFIRMATION METHOD (HOLD-DOWN CONFIRMATION) AND READJUSTMENTS

The following adjustments should always be performed when replacing the following components

IC301, PM501, D501, R565, R512, R322

1. Preparation before confirmation
   1) Supply 120±2.0V AC to with variable auto-transformer.
2. Hold-down operation confirmation
   1) Turn the POWER switch ON, and receive entirely white signals and adjust ABL current to 1300 ±20μA with PICTURE and BRIGHT etc controls.
   2) Apply DC voltage to the check terminal of pin ② of PM501 (A BOARD) via 1T40 from the DC stabilized power source. Confirm that the minimum voltage is less than 154.0V DC whereby the raster disappears during operation of hold-down circuit.
      NOTE: When the hold-down circuit starts operating, switch OFF the POWER of the set immediately.
   3) Turn the POWER switch ON, and receive dot signals and adjust ABL current to 30±20μA with PICTURE and BRIGHT etc controls.
   4) Apply DC voltage to the check terminal of pin ② of PM501 (A BOARD) via 1T40 from the DC stabilized power source. Confirm that the minimum voltage is less than 158.0V DC whereby the raster disappears during operation of hold-down circuit.
      NOTE: When the hold-down circuit starts operating, switch OFF the POWER of the set immediately.
3. Hold-down readjustment

   When step 2 is not satisfied, readjustment should be performed by altering the resistance value of R322

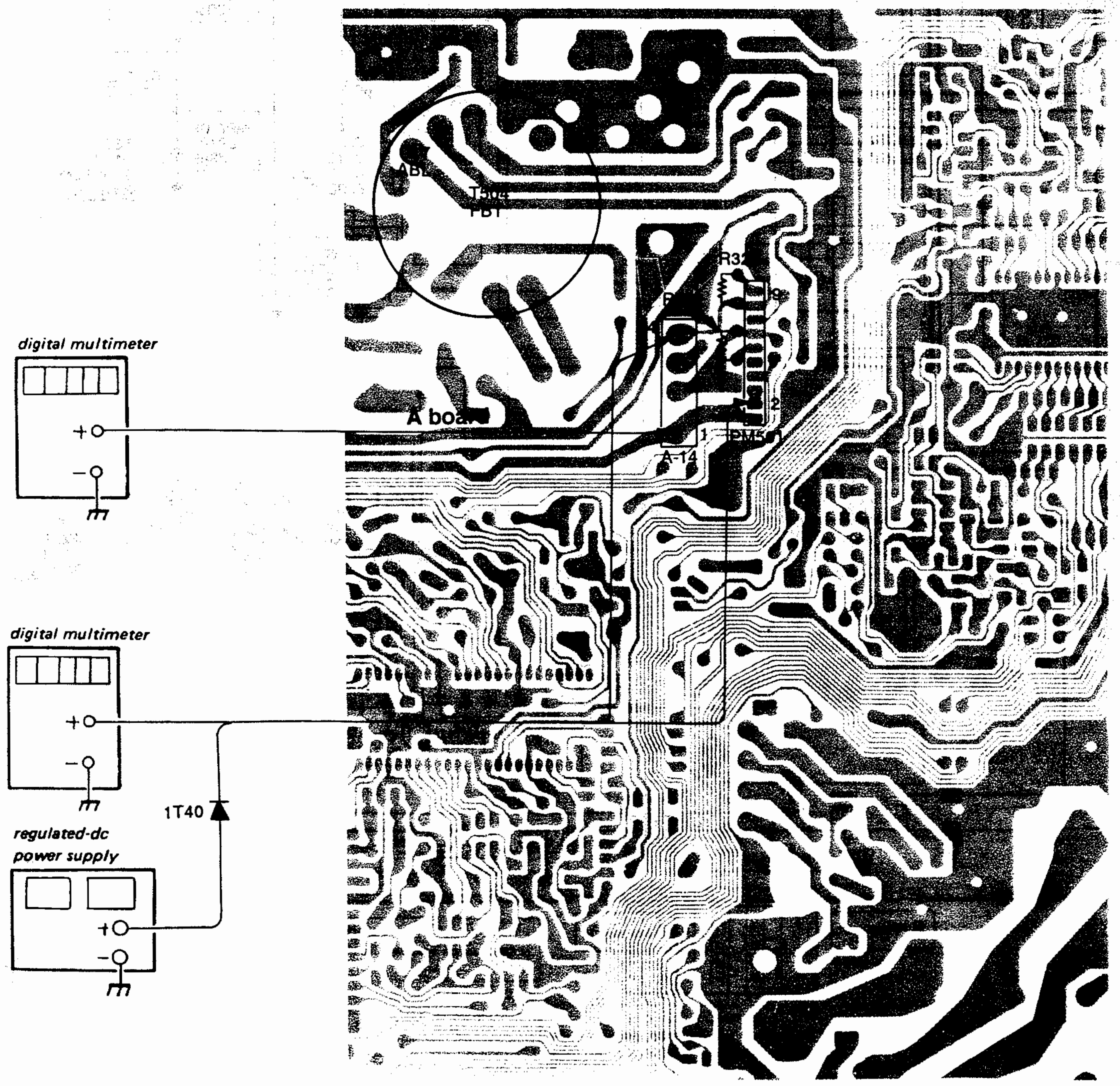


*Use a digital multimeter whose input impedance is over 100MΩ when confirming the voltage of the protector terminal.

+B VOLTAGE CONFIRMATION

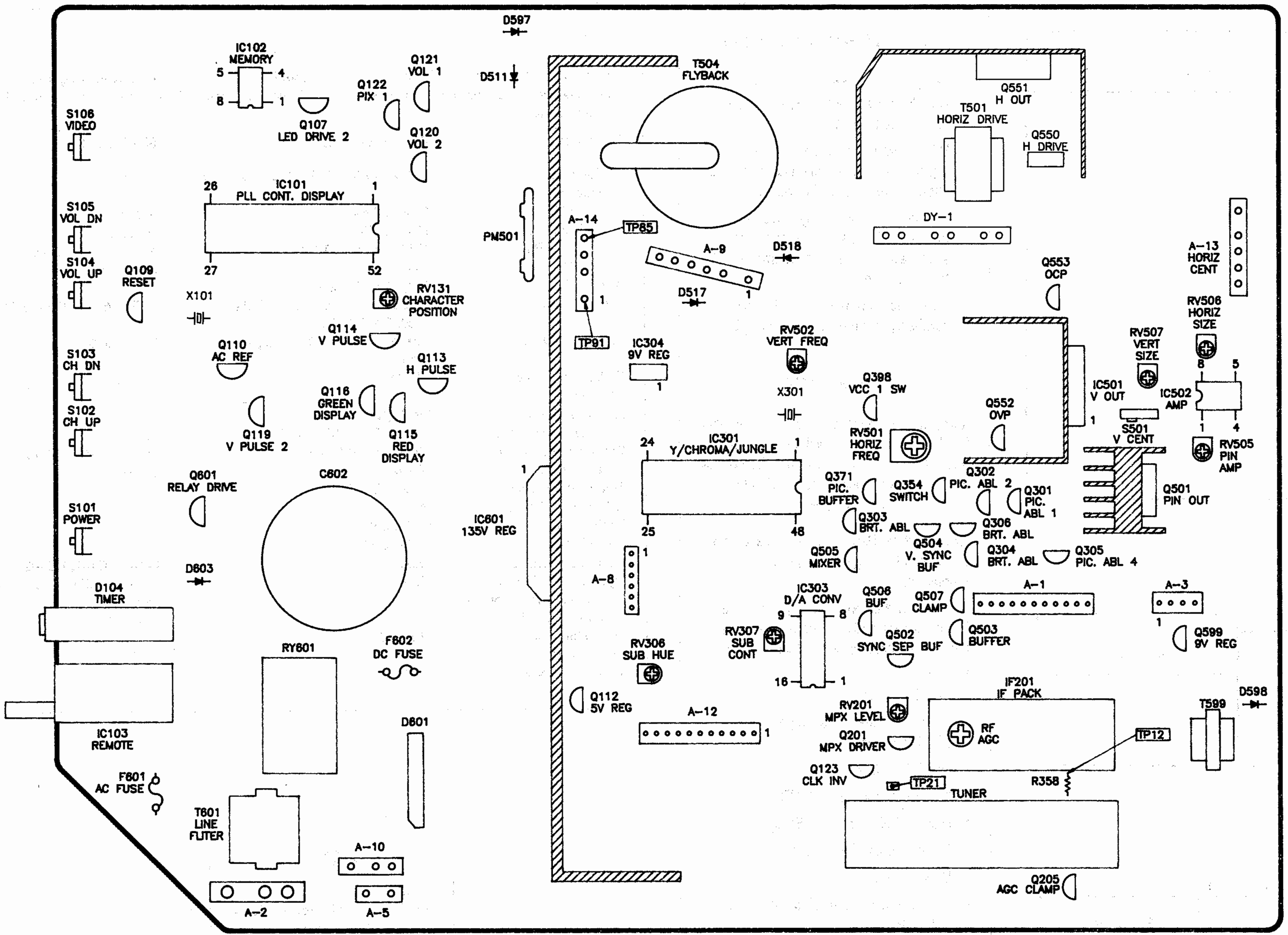
The following adjustments should always be performed when replacing IC601.

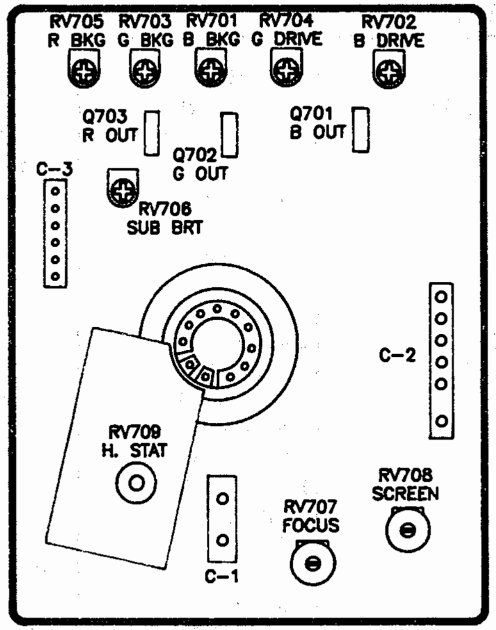
1) Supply 130$^{+2.0}_{-0}$V AC to with variable auto-transformer.
2) Receive entirely monoscope signal.
3) Set the PICTURE control and the BRIGHT controls in to initial reset.
4) Confirm the voltage of pin ① of A-14 (A BOARD) is less than 138.0V DC.
5) If step 4) is not satisfied, replace IC601 repeat above steps.



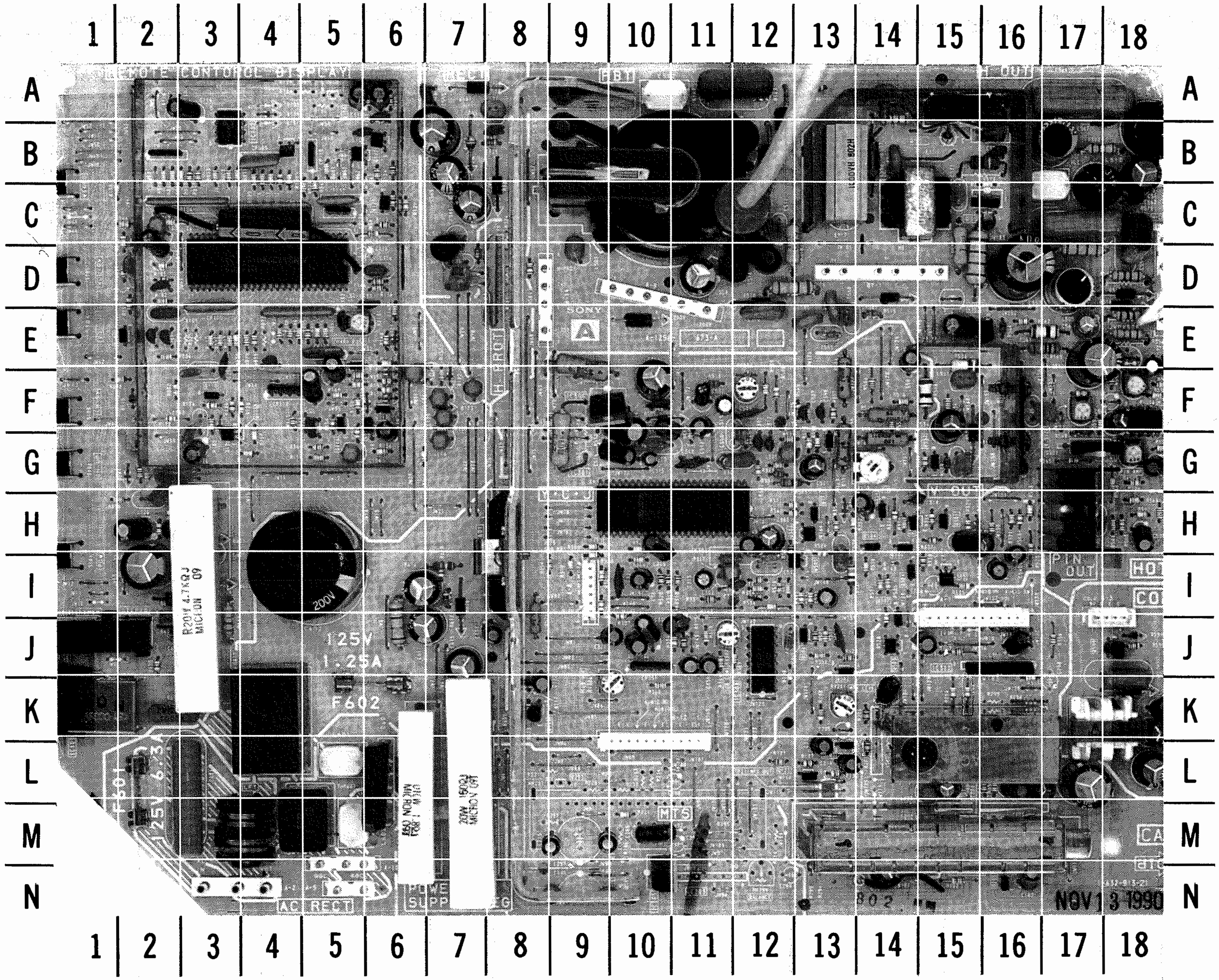
Courtesy of Manufacturer

PLACEMENT CHART





A - MAIN BOARD



A HOWARD W. SAMS GRIDTRACE™ PHOTO

A - MAIN BOARD - GridTrace LOCATION GUIDE

A-1	J-15
A-2	N-3
A-3	J-17
A-5	N-5
A-8	I-9
A-9	D-10
A-10	N-5
A-12	L-11
A-13	E-18
A-14	E-8
C047	D-2
C101	E-4
C102	N-16
C103	L-17
C104	N-14
C106	C-4
C107	B-6
C108	A-6
C109	A-6
C110	A-5
C114	A-3
C116	D-6
C118	D-2
C120	H-2
C121	J-8
C122	K-8
C126	G-3
C127	E-2
C128	E-2
C132	E-5
C133	D-6
C135	F-5
C136	F-5
C137	F-5
C139	G-6
C140	D-2
C142	K-14
C143	F-3
C144	F-3
C201	L-15
C205	K-13
C206	E-3
C214	L-13
C301	I-10
C302	G-12
C303	H-12
C305	H-10
C309	J-11
C312	G-12
C314	I-12
C315	I-11
C316	I-16
C317	H-15
C318	H-14
C322	J-10
C330	G-10
C331	L-16
C340	C-7
C351	J-16
C352	L-16
C353	L-13
C354	J-10
C355	J-10
C356	H-14
C357	J-11
C358	J-11
C364	F-10
C366	N-9
C367	N-10
C398	F-13
C501	G-13
C502	I-12
C503	H-12
C505	J-12
C507	F-13
C508	G-11
C509	F-12
C510	G-12
C511	G-10
C512	F-11
C513	F-11
C514	G-10
C515	G-10
C516	G-9
C517	C-12
C518	F-10
C520	I-13
C521	I-13
C522	J-13
C523	J-15
C530	F-11
C534	F-15
C535	G-16
C537	F-16
C538	G-16
C539	H-18
C540	I-16
C541	F-18
C542	E-17
C543	G-18
C546	H-17
C548	B-8
C549	B-7
C550	E-14
C551	C-16
C552	B-15
C553	B-16
C554	D-13
C555	E-13
C556	E-15
C557	D-16
C558	D-11
C559	C-18
C560	C-17
C561	B-18
C562	C-18
C563	B-13
C564	A-17
C565	A-11
C566	E-17
C567	B-18
C568	E-13
C569	D-7
C570	E-12
C571	C-15
C572	E-18
C580	E-13
C594	B-7
C595	A-7
C596	K-18
C597	L-18
C598	K-18
C599	K-18
C601	M-3
C602	I-5
C603	J-3
C604	J-3
C605	I-2
C606	H-2
C615	J-7
C616	I-6
C617	J-6
CF301	I-11
CP008	C-3
CP009	B-4
CP102	C-5
CP104	C-2
CP106	C-5
CP107	E-5
CP108	E-5
CP109	E-3
CP112	F-4
CP117	B-3
CP118	B-5
CP351	J-10
D001	C-2
D081	G-2
D082	G-2
D101	N-14
D104	J-1
D113	A-2
D114	A-2
D115	F-2
D117	K-8
D118	F-6
D119	F-6
D120	F-6
D121	E-6
D122	F-7
D123	F-7
D128	F-3
D321	C-8
D350	I-15
D351	H-13
D501	F-10
D508	G-15
D511	B-7
D512	D-16
D513	B-12
D514	A-12
D515	D-18
D516	D-18
D517	E-10
D518	D-12
D519	D-14
D597	A-7
D598	K-18
D599	J-18
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D604	J-3
D605	H-3
D606	I-7
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F602	K-5
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IC102	B-4
IC103	K-1
IC301	G-12
IC302	J-16
IC303	K-12
IC304	F-10
IC305	N-10
IC501	G-16
IC502	G-18
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L103	C-3
L104	G-5
L105	F-6
L106	G-7
L108	F-7
L109	F-7
L203	L-15
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L302	I-11
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L503	D-9
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L601	L-5
L602	M-5
L609	I-3
NL501	D-7
PM501	E-8
Q107	B-4
Q109	E-2
Q110	F-3
Q112	K-8
Q113	F-6
Q114	A-5
Q115	F-6
Q116	F-5
Q119	G-3
Q120	C-6
Q121	B-6
Q122	B-5
Q123	L-13
Q201	L-13
Q205	N-16
Q301	H-15
Q302	H-14
Q303	H-13
Q304	I-14
Q305	I-15
Q306	H-14
Q354	H-14
Q371	H-13
Q398	G-13
Q501	H-17
Q502	J-13
Q503	J-14
Q504	H-14
Q505	I-13
Q506	J-13
Q507	J-14
Q550	C-15
Q551	A-15
Q552	G-15
Q553	E-16
Q599	J-18
Q601	H-2
R001	B-5
R002	F-2
R003	B-3
R004	E-4
R005	E-4
R007	B-4
R008	B-4
R009	B-4
R010	B-3
R011	B-3
R013	B-3
R014	B-3
R015	B-2
R016	B-2
R017	C-2
R018	F-2
R019	D-2
R020	D-2
R021	D-2
R022	C-5
R023	C-6
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R027	E-3
R028	E-3
R029	E-4
R030	E-4
R031	B-3
R034	E-2
R035	E-5
R036	E-5
R037	E-5
R038	E-4
R040	C-2
R044	C-5
R046	C-2
R047	D-2
R089	G-2
R090	H-2
R102	N-15
R103	M-7
R108	K-12
R113	C-6
R115	F-4
R116	G-5
R117	E-3
R118	G-4
R120	F-4
R121	C-6
R123	L-12
R124	B-6
R125	B-6
R126	F-3
R127	L-13
R129	N-14
R130	L-13
R132	B-4
R136	D-6
R138	C-2
R139	B-4
R142	A-6
R143	A-6
R146	D-6
R147	E-6
R148	E-6
R149	E-6
R150	F-6
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R153	F-5
R154	F-5
R155	F-5
R156	G-6
R157	F-7
R158	G-5
R159	G-7
R160	F-5
R161	G-6
R170	K-8
R172	F-2
R174	F-3
R175	J-2
R176	C-6
R180	F-3
R182	D-3
R185	D-3
R203	L-15
R204	K-15
R205	L-14
R206	K-14
R207	G-4
R208	K-13
R209	K-16
R217	L-16
R222	K-15
R224	M-17
R240	N-16
R241	M-13
R301	G-12
R302	G-12
R304	J-11
R305	I-9
R306	I-9
R307	J-10
R308	I-9
R309	H-9
R310	I-9
R312	I-12
R313	G-12
R314	I-12
R315	J-11
R316	I-12
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R318	I-11
R319	I-10
R320	I-10
R321	H-16
R323	G-12
R325	B-8
R328	J-11
R329	H-15
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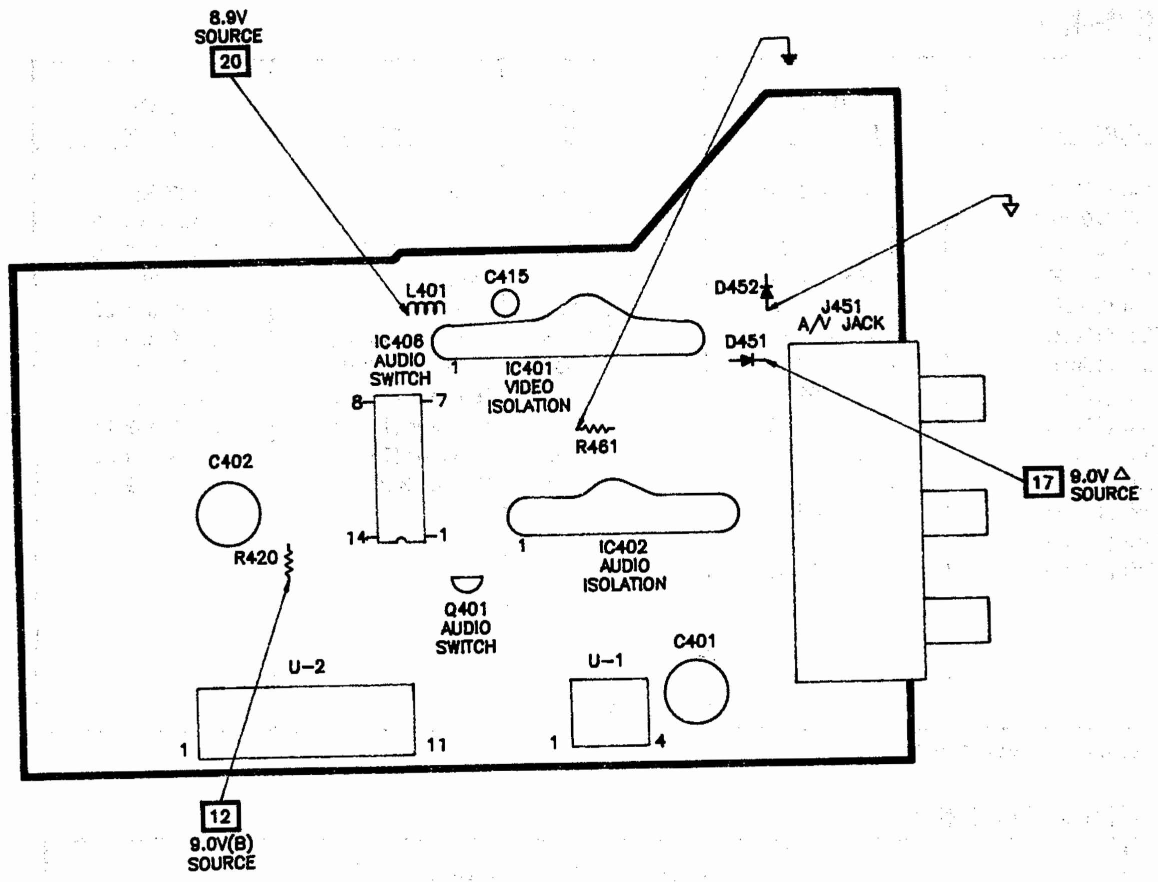
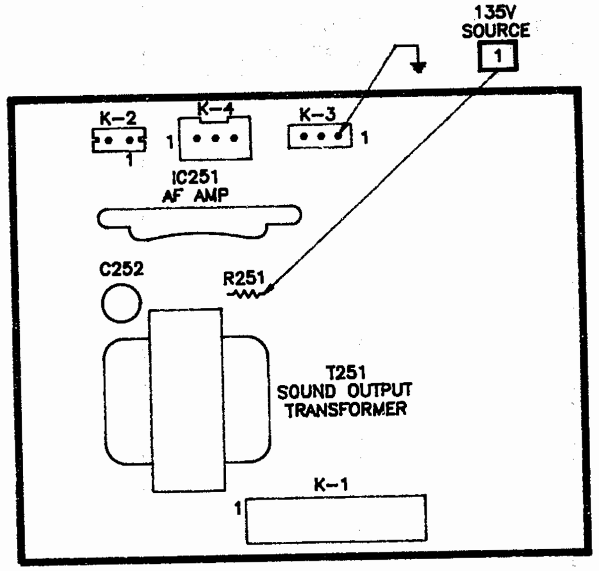
R331	I-11
R333	I-13
R334	H-15
R335	I-15
R336	H-14
R337	H-15
R338	I-15
R341	F-5
R342	G-5
R350	I-16
R352	H-13
R353	H-13
R354	I-9
R355	K-16
R356	J-17
R357	J-15
R358	L-16
R360	K-10
R361	H-12
R362	G-9
R363	J-12
R364	J-11
R366	I-10
R367	H-10
R371	H-12
R397	F-13
R398	G-13
R501	G-13
R502	G-14
R503	F-14
R504	F-13
R505	G-12
R506	F-14
R507	G-17
R508	F-12
R509	F-12
R510	G-11
R512	D-7
R513	F-12
R514	G-10
R515	G-10
R516	F-14
R517	H-16
R518	D-12
R519	G-13
R520	I-12
R521	J-13
R522	I-13
R523	H-16
R524	I-13
R525	H-12
R526	I-14
R527	I-13
R528	J-14
R529	J-13
R530	G-18
R531	J-13
R532	F-9
R533	J-14
R534	I-12
R535	I-14
R536	F-15
R537	I-14
R538	I-12
R539	G-15
R540	H-18
R541	H-18
R542	H-18
R543	H-18
R544	H-18
R545	G-17
R547	G-15
R548	F-15
R549	G-17
R550	G-18
R551	F-18
R552	J-13
R554	F-18
R555	F-18
R556	E-18
R557	F-14
R558	F-17
R559	F-17
R560	G-18
R561	E-17
R562	E-16
R563	H-16
R564	E-16
R565	F-13
R566	H-16
R567	F-9
R568	D-15
R569	E-17
R570	D-15
R571	J-8
R572	B-16
R573	B-16
R574	A-14
R577	D-17
R579	C-18
R580	B-17
R581	E-14
R582	D-18
R583	E-18
R586	E-15
R587	D-12
R589	D-8
R598	A-13
R599	J-18
R601	L-6
R602	L-6
R605	L-7
R610	K-2
R611	J-3
R612	I-3
R613	H-2
R614	H-2
R615	J-6
R616	I-7
R617	I-7
R618	I-7
RV131	E-5
RV201	K-13
RV306	K-10
RV307	J-11
RV501	G-14
RV502	F-12
RV505	G-18
RV506	F-18
RV507	F-17
RY601	K-4
S101	I-1
S102	G-1
S103	F-1
S104	E-1
S105	D-1
S106	B-1
S550	B-18
SG501	B-18
T501	C-15
T504	B-10
T599	K-18
T601	M-4
THP601	M-4
TP12	L-16
TP21	L-13
TP85	D-8
TP91	E-8
X101	E-2
X301	G-12

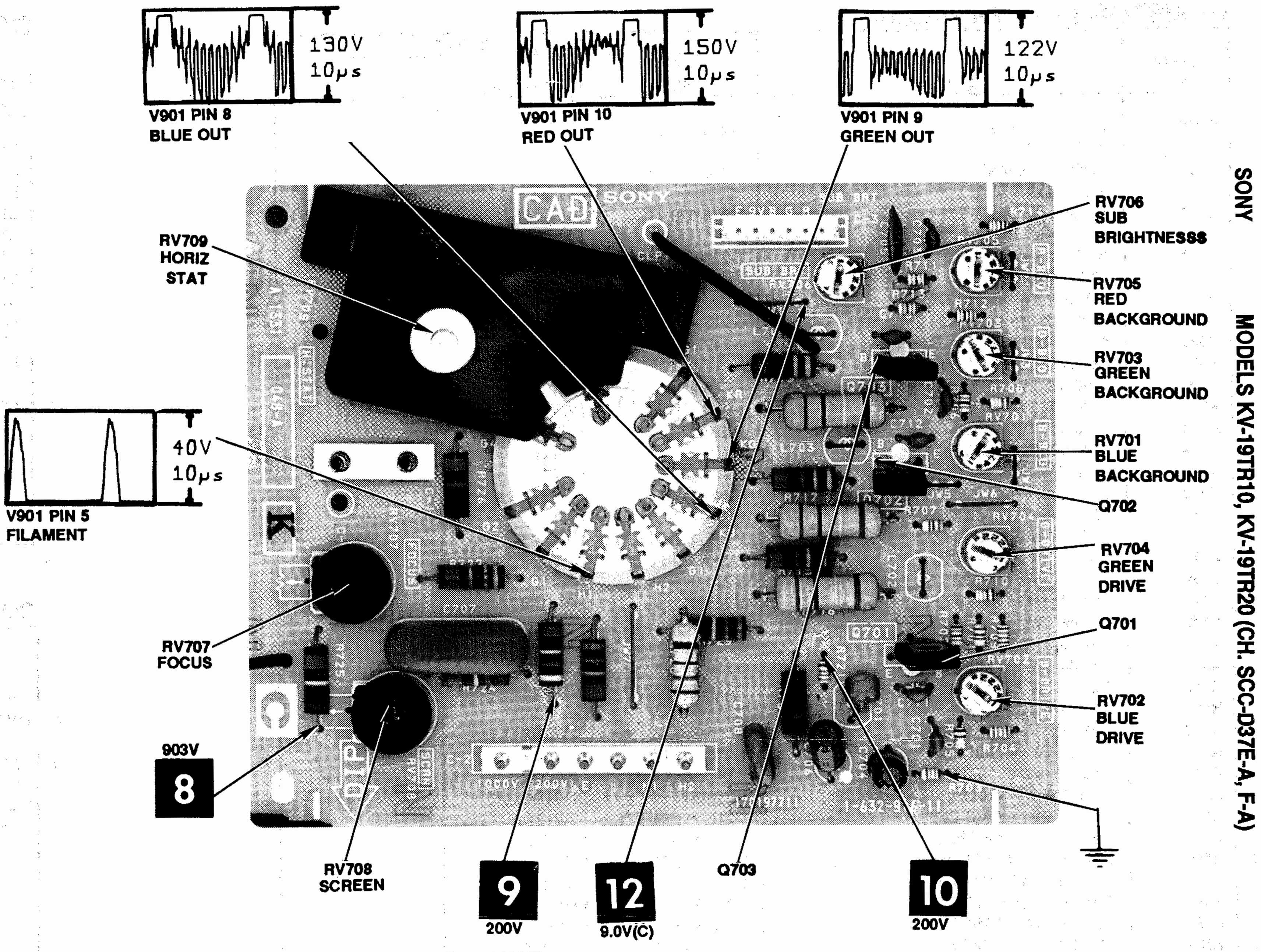
PLACEMENT CHART continued



△ TAKEN WITH RESPECT TO ISOLATED GROUND.



C - CRT BOARD



NOTE: ARROWS ON TRANSISTORS INDICATE BASE UNLESS NOTED

PARTS LIST continued

RESISTORS (Power and Special)

	ITEM No.	RATING	REPLACEMENT DATA		
			MFGR PART No.	NTE PART No.	
	CP106	Resistor NetWork 22Kx5%x2	1-236-357-11		
	CP112	Resistor NetWork 22Kx5%x3	1-236-490-11		
	CP117	Resistor NetWork 47Kx5%x3	1-236-078-11		
	CP351	Resistor NetWork 10Kx5%x4	1-236-491-11		
	R103	10K 5% 3W NF Mtl Oxd	1-215-923-00	3W310	
	R301	130K 1% 1/6W Mtl Flm	1-215-472-00	----	
#	R325	4.7 5% 1/4W NF Cbn Flm	1-249-389-11	WQ4D7	
	R362	22 5% 3W NF Mtl Flm	1-215-907-11	3W022	
	R501	1800 5% 2W NF Mtl Oxd	1-216-458-11	2W218	
	R502	1800 5% 2W NF Mtl Oxd	1-216-458-11	2W218	
	R503	1800 5% 2W NF Mtl Oxd	1-216-458-11	2W218	
	R504	1800 5% 2W NF Mtl Oxd	1-216-458-11	2W218	
	R505	130K 1% 1/4W Mtl Flm	1-214-780-00	----	
	R512	330 5% 1/4W Cbn Flm	1-249-411-11	QW133	
	R513	130K 1% 1/6W Mtl Flm	1-215-472-00	----	
	R514	33K 1% 1/6W Mtl Flm	1-215-457-00	----	
#	R518	6.8 5% 2W NF Mtl Oxd	1-216-379-11	2W6D8	
	R539	10 1% 1/6W Mtl Flm	1-215-373-31	----	
	R549	680 5% 1/4W NF Cbn Flm	1-249-415-11	QW168	
	R556	1.8 5% 1W NF Mtl Oxd	1-216-352-11	1W1D8	
	R564	680 1% 1/6W Mtl Flm	1-215-419-11	----	
#	R567	6.8 5% 3W NF Mtl Oxd	1-216-399-00	3W6D8	
#	R568	1.2 5% 3W NF Mtl Oxd	1-216-390-51	3W1D2	
	R569	100K 1% 1/2W Metal Flm	1-214-913-00	----	
#	R570	1000 5% 1W NF Mtl Oxd	1-215-869-11	1W210	
#	R571	3.9 5% 1W NF Mtl Oxd	1-216-356-00	1W3D9	
#	R573	10K 5% 1/2W NF Cbn Flm	1-247-764-11	HW310	
	R574	1 5% 1W NF Mtl Oxd	1-216-349-00	1W1D0	
#	R577	120 5% 2W NF Mtl Oxd	1-216-451-91	2W121	
#	R579	680 5% 1/4W NF Cbn Flm	1-249-415-91	QW168	
#	R580	180 5% 1W NF Mtl Oxd	1-216-428-91	1W118	
	R581	470 5% 1/4W NF Cbn Flm	1-249-413-11	QW147	
	R582	100 5% 1W NF Mtl Oxd	1-215-863-11	1W110	
	R583	100 5% 1W NF Mtl Oxd	1-215-863-11	1W110	
#	R587	15K 5% 2W NF Mtl oxd	1-215-441-11	QW315	
	R598	4.7 5% 1/4W NF Cbn Flm	1-249-389-11	QW4D7	
#	R601	1M 10% 1/2W Cbn Comp	1-202-719-91	HW510	
#	R602	1.8 5% 10W NF WW	1-205-792-11	10W1D8	
#	R605	150 5% 20W NF WW	1-205-691-11	25W115	
#	R610	100 10% 2W NF WW	1-217-224-11	----	
	R611	3300 5% 1W NF Mtl Oxd	1-215-872-11	1W233	
	R612	4700 5% 20W WW	1-205-744-11	25W247	
#	R615	12K 55 1/4W 2W NF Mtl Oxd	1-216-463-91	QW312	
#	R616	3300 5% 1/4W NF Cbn Flm	1-247-719-91	QW233	
	R617	47 5% 1/4W NF Cbn Flm	1-247=895-00	QW047	
	R716	15K 5% 2W NF Mtl Oxd	1-215-899-11	2W315	
	R718	15K 5% 2W NF Mtl Oxd	1-215-899-11	2W315	
	R720	15K 5% 2W NF Mtl Oxd	1-215-899-11	2W315	
#	R728	1.8 5% 2W NF Mtl Oxd	1-216-372-11	2W1D8	
#	THP601	26.6 Cold PTC Tap 10.3	1-808-081-13	----	

For SAFETY use only equivalent replacement part.

COILS (RF-IF)

	ITEM No.	FUNCTION	MFGR PART No.
	L102	Coil (100uH)	1-408-421-00
	L103	Coil (100uH)	1-408-421-00
	L104	Coil (3.9uH)	1-408-404-00
	L105	Coil (3.9uH)	1-408-404-00
	L106	Coil (3.9uH)	1-408-404-00
	L108	Coil (15uH)	1-410-472-41
	L109	Coil (15uH)	1-410-472-41
	L203	Coil (8.2uH)	1-408-408-00
	L301	Coil (15uH)	1-410-472-41
	L302	Coil (18uH)	1-410-473-11
	L401	Inductor (33uH)	1-410-515-11
#	L501	Coil (18uH)	1-410-666-41
#	L502	Coil (22uH)	1-408-938-11
#	L503	Coil (33uH)	1-410-669-41

	ITEM No.	FUNCTION	MFGR PART No.
	L506	Coil	1-407-365-00
	L507	Coil	1-408-349-00
	L508	Inductor (4.7MMH)	1-408-239-00
#	L509	Coil	1-459-390-11
	L511	Coil	1-459-075-00
	L513	Inductor (15uH)	1-410-665-31
#	L601	Inductor (3.3uH)	1-408-225-11
#	L602	Inductor (3.3uH)	1-408-225-11
	L609	Inductor (1.2uH)	1-410-459-11
	L701	Inductor (180uH)	1-408-424-00
#	T251	Sound Output	1-427-479-11

For SAFETY use only equivalent replacement part.

COILS & TRANSFORMERS

	ITEM No.	FUNCTION	MFGR PART No.	OTHER IDENTIFICATION	NOTES
#	DY801	Yoke 100° Horiz 1.5mH Vert 23.3 mH	1-451-260-22	1-451-260-13(1)	
#	T251	Sound Out Transformer	1-427-479-11	427-479(1)	
	T501	Horiz Transformer	1-437-090-00	437-090(1)	
#	T504	Flyback Transformer	1-439-483-11	1-439-482-11(1)	
#	T599	Isolation Transformer	1-421-857-11	1-421-857-11(1)	

For SAFETY use only equivalent replacement part.
(1) Number on unit

PARTS LIST continued

ELECTROLYTIC CAPACITORS Items not listed are normally available at local distributors.

ITEM No.	RATING	MFGR PART No.
C047	10 16V 20% NP	1-126-320-11
C136	1 50V 20% NP	1-124-499-11
C137	1 50V 20% NP	1-124-499-11

ITEM No.	RATING	MFGR PART No.
C316	.47 50V 20% NP	1-126-529-11
# C602	560 200V 20%	1-125-594-11

For SAFETY use only equivalent replacement part.

CAPACITORS Items not listed are normally available at local distributors.

ITEM No.	RATING	MFGR PART No.
C132	39 NPO 50V 5%	1-102-965-00
C133	100 NPO 50V 5%	1-102-973-00
# C517	.012 200V 5%	1-106-369-91
# C548	820 500V 10%	1-102-212-91
# C552	560 2KV 10%	1-162-135-91
# C554	680 2KV 10%	1-162-116-91
# C555	.0068 100V 10%	1-108-375-91
# C560	.68 200V 5%	1-136-109-11
# C562	470 500V 10%	1-102-228-91
# C563	.08 2KV 3%	1-136-966-11
# C564	1 200V 5%	1-136-111-11
# C565	.043 400V 5%	1-136-312-51
# C567	.001 500V 10%	1-162-318-91
# C580	680 2KV 10%	1-162-116-91
# C601	.22 125V 20%	1-108-745-52

ITEM No.	RATING	MFGR PART No.
CP008	Cap Block 220x10%x8	1-233-147-11
CP009	Cap Block 220x10%x3	1-233-145-11
CP102	Cap Block 220x10%x3	1-233-145-11
CP104	Cap Block 220x10%x8	1-233-147-11
CP107	Cap Block 39x10%x3	1-233-146-11
CP108	Cap Block 220x10%x7	1-233-118-11
CP109	Cap Block 220x10%x4	1-233-117-11

For SAFETY use only equivalent replacement part.

CONTROLS (All wattages 1/2 watt or less, unless listed)

ITEM No.	FUNCTION	RESISTANCE	MFGR PART No.	NOTES
RV131	Character Position	1000	1-238-012-11	
RV201	MPX Level	10K	1-238-016-121	
RV306	Sub Hue	1000	1-238-012-11	
RV307	Sub Contrast	470	1-238-011-11	
RV501	FH	100K	1-228-728-00	
RV502	FV	100K	1-238-020-11	
RV505	Pin Amp	22K	1-238-017-11	
RV506	H Size	47K	1-238-019-11	
RV507	V Size	330	1-238-010-11	
RV508	Pin Phase	---	------------	
RV701	Blue BackGround	4700	1-228-993-00	
RV702	Blue Drive	2200	1-228-991-00	
RV703	Green BackGround	4700	1-228-993-00	
RV704	Green Drive	2200	1-228-991-00	
RV705	Red BackGround	4700	1-228-993-00	
RV706	Sub Brightness	22K	1-228-995-00	
RV707	Focus	2.2M	1-230-641-11	
RV708	Screen	2.2M	1-230-641-11	
# RV709	H Stat	110M	1-230-619-11	

For SAFETY use only equivalent replacement part.

PARTS LIST

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFR PART No.	NTE PART No.	ECG PART No.	TCE PART No.
D001	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D081	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D082	RD5.1ES-B3	8-719-109-86	NTE5010T1	ECG5010T1	SK9967
D101	RD33ES-B2	8-719-110-78	NTE5036A	ECG5036A	SK33A
D104	LEDU-9	1-808-919-11			
D113,14	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D115	RD4.3ES-B1	8-719-109-74	NTE5008A	ECG5008A	SK4A3
# D117	RD5.6ES-B2	8-719-109-89	NTE5011A	ECG5011A	SK5A6
D118 - D123	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D128	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D151(1)	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D199	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D321	EL1Z	8-719-302-43	NTE587	ECG587	SK9937
D350,1	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D451,2	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D501	RD5.6ES-B2	8-719-109-89	NTE5011A	ECG5011A	SK5A6
D508	U05G	8-719-911-55	NTE5806	ECG5806	SK3848
# D511	V19E	8-719-901-93	NTE552	ECG552	SK9000
# D512	1SS119	8-719-911-19	NTE519	ECG519	SK3100
D513	ERC06-15S	8-719-945-80	NTE525	ECG525	SK3925
D514	ERD28-08S	8-719-928-08	NTE506	ECG506	SK3925
D515,516	U05G	8-719-911-55	NTE5806	ECG5806	SK3848
# D517	RH-1AV1	8-719-303-21	NTE552	ECG552	SK9000
# D518	ES1F	8-719-300-65	NTE558	ECG558	SK3998
D519	RGP02-17	8-719-976-64			
D597	RGP15J	8-719-901-58	NTE580	ECG580	SK5036
D598	RH-1C	8-719-300-70	NTE506	ECG506	SK3925
# D599	RD10ES-B2	8-719-110-17	NTE5019A	ECG5019A	SK10A
# D601	RBV-406H	8-719-305-07	NTE5330	ECG5330	SK9972
# D602	10E2	8-719-200-02	NTE116	ECG116	SK3313
D603,4	RM11C	8-719-304-63	NTE125	ECG125	SK3081
D605	RD6.2ES-B2	8-719-109-93	NTE5013A	ECG5013A	SK6A2
D606	U05G	8-719-911-55	NTE5806	ECG5806	SK3848
IC101	M34302M8-511SP				
	M34302M8-511	8-759-634-46			
IC102	CAT59C11P				
	CAT59C11HP	8-759-748-69			
IC103	KEY-C00SV	8-749-920-65			
IC203(1)	MB3110APS-G-SNY	8-759-983-38			
IC251	SI-4102	8-749-900-15	NTE1871	ECG1871	SK10140
IC301	CXA1013AS	8-752-031-72			
# IC302	CX20061	8-752-006-12			
# IC303	UPD6325C	8-759-104-05			SK9718
# IC304	MC7809CT				
	RC7809FA	8-759-982-10			
# IC305	MC7812CT	8-759-013-09	NTE966	ECG966	SK3592
IC401	IVM-1	1-235-783-21			
IC402	IAM-1	1-235-784-12			
IC406	MC14066BCP	8-759-000-49	NTE4066B	ECG4066B	SK4066B
IC501	UPC1378H		NTE1676	ECG1676	SK7653
	UPC1378H-P	8-759-105-82	NTE1676	ECG1676	SK7653
IC502	RC4558P	8-759-945-58	NTE778A	ECG778A	SK3465
# IC601	STR3035	8-749-930-35	NTE1743	ECG1743	SK9996
IF201	IFF-450A	1-464-756-21			
MM201	SBX1568-51	8-741-156-80			
Q107	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	TYPE No.	MFR PART No.	NTE PART No.	ECG PART No.	TCE PART No.
Q109	2SA1309AR		NTE2362	ECG2362	SK10094
	KSA1175	8-729-922-68	NTE2362	ECG2362	SK10094
Q110	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q112	2SD789C		NTE315	ECG315	SK9137
	2SD789-03C	8-729-177-42	NTE315	ECG315	SK9137
Q113	2SA1309AR		NTE2362	ECG2362	SK10094
	KSA1175	8-729-922-68	NTE2362	ECG2362	SK10094
Q114,15,16	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q119 - Q122	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q123	2SA1309AR		NTE2362	ECG2362	SK10094
	KSA1175	8-729-922-68	NTE2362	ECG2362	SK10094
Q201	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q205	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q301,2	2SC3311AR		NTE2361	ECG2361	SK10093
	2SC3311A-RTA		NTE2361	ECG2361	SK10093
	2SC2785-HFE	8-729-119-78	NTE2361	ECG2361	SK3124A
Q303,4	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q305	2SA1309AR		NTE2362	ECG2362	SK10094
	KSA1175	8-729-922-68	NTE2362	ECG2362	SK10094
Q306	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q354	2SA1309AR		NTE2362	ECG2362	SK10094
	KSA1175	8-729-922-68	NTE2362	ECG2362	SK10094
Q371,398	2SC3311AR	8-729-922-69	NTE2361	ECG2361	SK10093
Q401	DTC144ES	8-729-900-89	NTE2359	ECG2359	SK9959
# Q501	2SD1585K		NTE291	ECG291	SK3440
	2SD1585-K	8-729-107-26	NTE291	ECG291	SK3440
Q502	2SA1309AR		NTE2362	ECG2362	SK10094
	KSA1175	8-729-922-68	NTE2362	ECG2362	SK10094
Q503	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q504	2SA1309AR		NTE2362	ECG2362	SK10094
	KSA1175	8-729-922-68	NTE2362	ECG2362	SK10094
Q505	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q506	2SA1309AR		NTE2362	ECG2362	SK10094
	KSA1175	8-729-922-68	NTE2362	ECG2362	SK10094
Q507	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q550	2SC2688KA		NTE157	ECG157	SK3747
	2SC2688-LK	8-729-119-80	NTE157	ECG157	SK3747
Q551	2SD1878		NTE2331	ECG2331	SK10088
	2SD1878-CA	8-729-821-87	NTE2331	ECG2331	SK10088
Q552	2SC3311AR		NTE2361	ECG2361	SK10093
	KSC2785	8-729-922-69	NTE2361	ECG2361	SK10093
Q553	2SA1221L				
	2SA1221-L	8-729-122-12			
Q599	2SD789D		NTE315	ECG315	SK9137
	2SD789-4	8-729-378-92	NTE315	ECG315	SK9137
Q601	2SC2551R		NTE399	ECG399	SK9352
	2SC2551-O	8-729-255-12	NTE399	ECG399	SK9352
Q701,2,3	2SC2611	8-729-326-11	NTE157	ECG157	SK3747

For SAFETY use only equivalent replacement part. (1)USED IN MODEL KV-19TR10

PARTS LIST continued

MISCELLANEOUS

	ITEM No.	DESCRIPTION	MFGR PART No.	NOTES
	CF301	Trap	1-409-344-00	3.58MHZ
#	F601	Fuse 6.3A 125V	1-532-748-11	
#	F602	Fuse 1.25A 125V	1-532-741-11	
	IF201	IF Block	1-464-756-211	
	L505	Ferrite Coil	1-459-104-00	
#	L516	Ferrite Coil	1-459-407-11	
	NL501	Lamp	1-519-108-99	Neon
#	P001	Cord,AC Line	1-559-396-11	
	PM501	Module Prot	1-808-979-11	
#	RY601	Relay	1-515-573-13	Power
	SG501	Spark Gap	1-519-422-11	
#	V901	CRT	8-737-353-05	
	X101	Oscillator	1-567-192-11	Ceramic
	X301	Oscillator	1-567-505-11	Crystal
		A Board	A-1296-672-A	Main
		C Board	A-1331-048-A	
		K Board	1-632-915-11	
		Terminal Bd	4-397-423-11	
		U Board	A-1373-214-A	

For SAFETY use only equivalent replacement part.

SPEAKERS

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFGR PART No.	QUAM PART No.	
SP902	3 9/16" x 2" 8 Ohm 5W PM	1-544-283-11		

CABINETS & CABINET PARTS (When ordering specify model, chassis and color.)

ITEM	PART No.	ITEM	PART No.
Cabinet Assy	X-4380-070-1 X-4380-070-2(1)		
Cover, Rear	4-397-422-01		

(1) Used in model KV-19TR10 only.

Important Parts Information

- The parts listed here are those not usually available from a well-stocked supply cabinet or bin.
- Where items may be replaced with equivalent parts, several alternates are shown from participating vendors.
- On the parts lists, safety items are marked with a # to remind you that only exact replacements are recommended for these items.
- When ordering parts, state the model number, part number, and description.

Obtaining Parts

Many of these parts are available from your local Sams authorized distributor or the manufacturer of the equipment. Call Sams for the name of your nearest distributor:

800-428-7267

Or consult the Sams *Annual Index* for the address of the original equipment manufacturer.

Information is listed in these pages for the following participating vendors. Consult the Sams *Annual Index* for their current address.

- B&K Precision
- Custom Components Corporation (Chek-A-Color)
- GC-THORSEN
- NTE Electronics, Inc. (NTE)
- Philips ECG Company (ECG)
- Quam-Nichols Co. (Quam)
- Sencore, Inc.
- Thomson Consumer Electronics, Inc. (SK, TCE)

TEST EQUIPMENT

Test equipment listed by participating manufacturers illustrates typical or equivalent equipment used by Sams engineers to obtain measurements. This equipment is compatible with most types used by field service technicians.

Equipment	**B&K Precision No.**	**SENCORE No.**
Oscilloscope	1541A, 2120, 2125, 2160, 2190, 2522	SC61
Generators		
RGB	1249A, 1260	RG67
Multiburst Signal	1251, 1260	VA62A
Color Bar	1211A, 1249A, 1251, 1260	VA62A, CG25,NT64
TV Stereo	2009	ST65, ST66
Analog VOM	114, 117, 177, 214	-
Digital VOM	377, 388HD, 2700 Series, 2831A, 2860, 2900 Series	DVM37, DVM56A, SC61
Frequency Meter	1803A, 1804A, 1805, 1822, 1851, 1855	FC71, SC61
Hi-Voltage Probe	HV-44	HP200
VOM/DMM	-	TP212
Accessory Probes	PR-28(HV)	-
Isolation Transformer	TR110, 1604, 1653, 1655	PR57
Capacitance Analyzer	810A, 815, 820, 830	LC76, LC101, LC102
CRT Analyzer	480, 490	CR70
Temperature Probe	TP-28, TP-30	-
AC Leakage Tester	1655	PR57
Logic Probe	DP21, DP51	-
Logic Pulser	DP31, DP101	-
Inductance Analyzer	875A	LC76, LC101, LC102
Flyback Yoke Tester	875A	VA62A, LC76, LC101, LC102
TV Stereo Power Monitor	-	SR68
Field Strength Meter	-	FS73, FS74
Transistor Tester	510, 520B, 530	TF46
Video Analyzer	-	VA62A
Modulator/Converter	1201	-

Created with pride by the employees of Howard W. Sams & Company.

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